The Mining and Metallurgical Journal

VOL. XX. NO. 9 LOS ANGELES, CAL., February 1, 1899, NEW YORK, N. Y. Price 15 Cents

ALPHABETICAL INDEX TO ADVERTISERS

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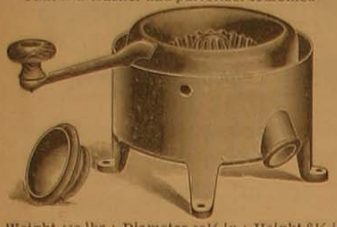

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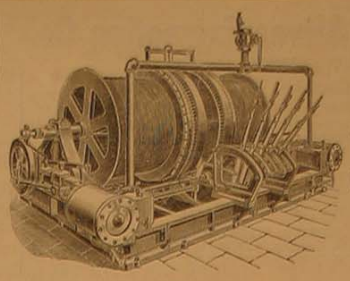

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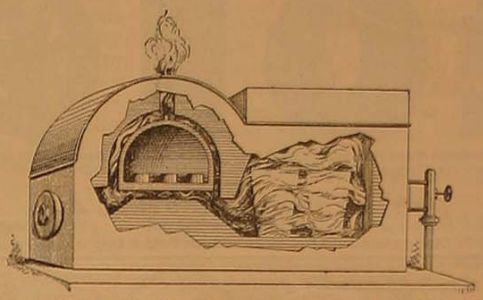

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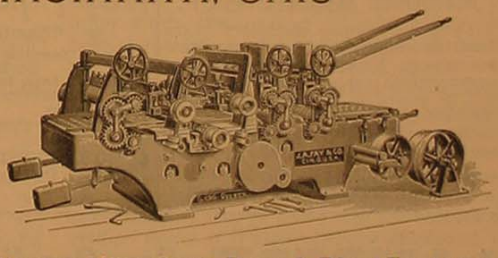

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ISSUED SEMI-MONTHLY

ADVERTISING RATES FURNISHED ON APPLICATION.

PROPOSED SILVER LEGISLATION.

The silver producing districts of the west are much interested in anything that pertains to the oft-repeated promises of the politicians at election times that "something would be done to aid an important silver industry." A mere shadow of hope passes over the wide sea of uncertainty through the presentation by United States Senator Pettigrew of Senate Bill, No. 5110, entitled: A bill to provide for the coinage of the American product of silver, and to increase and extend our import trade with all silver-using countries. Section 1 in in part says:—"On and after the passage of this Act, any citizen of the United States, or any corporation doing business under the laws of any State, or Territory of the United States, may deposit at any of the several mints of the United States, not less than 50 ounces, troy weight, nor less than 900 fine of any silver bullion, actually mined and produced in any State or Territory of the United States, and receive therefor for every 371¼ grains, troy weight, of pure silver, one silver dollar of the weight of 412½ grains, troy weight, of standard silver, as provided in the Act of January 18, 1837, or at the option of any such citizen, or such corporation depositing any silver bullion mined and produced any State or Territory of the United States, at any of the several mints, as herein provided. The depositor may receive in lieu of such silver dollars, silver certificates for a similar amount. The silver deposited to be held for redemption of silver certificates, both being legal tender for all debts, public and private. Sec. 2 provides that silver certificates shall only be issued to equal the amount of silver bullion or coin on deposit. Sec. 3. Foreign silver, from a free coinage of silver country, received in payment for any product of America, must pay one-half of one per cent duty per troy ounce of pure silver, before it can be coined into U. S. silver coin or receive silver certificates for a like amount. Sec. 4 imposes a duty on all other silver bullion or coin imported into the United States, or any Territory of the United States, of sixty-five cents for each troy ounce of pure silver. Any violations of the provisions of this Act shall be punished by imprisonment for one year, or by a fine of one dollar and twenty-five cents for each troy ounce of silver imported in violation of this Act, or by both such imprisoment and fine. Sec. 5. That whenever any obligation of the United States, excepting the silver certificates issued and provided for under this Act, shall be presented for payment or redemption, the Secretary of the Treasury shall pay or redeem such obligations in gold and silver both, according to the relative amounts of each in the treasury on the day of presentation, but all United States notes now outstanding and so redeemed, shall be reissued, and if any of the silver certificates issued under the provisions of this Act be held in the Treasury, they shall be counted as silver coin in estimating the relative amounts of gold and silver in the Treasury, and may be issued in lieu of silver coin. Sec. 6 says that when there is not sufficient gold and silver in the treasury, bonds may be issued of the denomination of fifty dollars, and the multiple of fifty dollars, to meet the obligations of the government.

Our ever increasing demand for more silver coin for home use, together with the extra necessity at present for a large supply of United States silver coin for the colonial possessions, acquired as a result of the late war with Spain, make the increased coinage of silver under the Act a pressing necessity. The premium offered to free silver coinage countries is a move which will tend to increase our foreign trade in machinery and manufactured goods from the United States, and would divert that trade from Germany and Great Britain.

Politically, this Act would have the effect of taking the silver question out of debate, if the gold faction in the House will look far enough ahead, to make a wise move for present and future requirements of the country, and settle the question for the benefit of home industry, foreign trade and strength to the party now in power.

A SALT LAKE RAILROAD.

Los Angeles will have another railroad. The Utah and Pacific railroad has purchased the depot site. This fact is verified by those who are in possession of the facts.

The entire deal includes about 182 acres, and comprises the following lands: G. W. Frink, 10 acres; Russell, Plater & Black, 23 acres; Workman & Burke, 11 acres; A. Jacoby, 27 acres; J. Regan, 25 acres; W. H. Workman, 60 acres, and Mrs. Hollenbeck, 30 acres. These lands extend from First to Seventh streets, and from the Los Angeles river to the bluffs.

The money involved approaches $300,000. This is less than $1,500 an acre, and is in great contrast to the $6,000 an acre the Santa Fe paid several years ago for similar lands, and the $65,000 the Southern Pacific paid for eighty-one acres on Alameda street several months since. It is safe to say that lands in Los Angeles will never be purchased at so low a figure again.

These lands are to be used not only as a depot site for the Utah and Pacific, and other roads that will be built into Los Angeles, but also for railroad yards, switches, car houses and warehouses with platforms with quick unloading.

Another branch of the operation of the syndicate handling the deal involves the bonding of the O. T. Johnson hotel site, between Ninth and Tenth street and Los Angeles and Main streets. This bond is for $160,000 and matures in ninety days.

This hotel property is to be used for an uptown depot. The property, according to the promoters will be reached by the construction of a raised railroad track, which will skirt ihe river for a distance and then run up Tenth street.

The old rumor that the Terminal road will be the western outlet for this new railroad is revived.

The outcome of these negotiations is awaited with much interest. The whole matter demonstrates that the construction of the San Pedro harbor is stimulating the railroad corporations of the country that are anxious to secure a foothold in Los Angeles, Cal.

THE MONETARY SITUATION.

As should have been expected, the Secretary of the Treasury and the Bankers' Alliance seem to have given up all idea of making an effort for monetary legislation during the present session of Congress. There is no time which can be devoted to that subject and there is apparently an indisposition to take it up under the present condition of public affairs. No doubt this is excessively annoying to Secretary Gage and the Bankers' Alliance.

The government has proceeded far enough in the commercial and fiscal affairs of Cuba and Porto Rico to have discovered that their wants are likely to materially modify the policy that should be adopted, and the condition will be further modified when the Phillippines are fully in hand and opened to commerce and industrial development. It will take some time to fully disclose what those countries will need, and their needs will considerably affect those of our states and territories on this continent.

There is another matter which is having no inconsiderable influence. During the last eighteen months the balance of trade has been immensely in our favor, and yet but a small part of it has been paid in gold; or, in other words, the amount of gold which has been imported is disappointing, and hence there is not so much confidence as was expected that we would accumulate a sufficiency of gold to enable us to float as large a volume of paper money as the wants of the country require. The reason for the disappointment to the general public is that so many of our securities are held abroad that interest on them absorbs a large amount of the balance of trade. Some of it also has been employed in extinguishing the principal of those securities.

Another important fact is that an immense amount of English capital is invested in this country, which has been earning dividends and profits, and quite an amount of our nominal exports are of British productions in this country, the pay for which is retained in England and Scotland by the investors residing there. The dividends and profits of course are remitted to the investors.

Though for the last two years the actual balance of trade has been against the United Kingdom, still she has suffered no loss of gold, for income on investments all over the world by the British people is always im-

mense and the earnings of her merchantmen have been large, as English shipping carries more than the ships of all other nations. Our outlay to foreigners for transporting for us on the sea is put down at $100,000,000 annually, which is paid in gold or its equivalent.

So far as foreign trade is concerned for the present we are in easy circumstances, except in regard to ocean transportation. The prospective balance of trade in our favor in future will enable us to meet all gold obligations to foreign peoples, but it is not at all probable that we can accumulate and retain gold coin in sufficient quantity to redeem the volume of paper that will be needed in our domestic trade. As soon as there is suspicion of inability to exchange it for metal money, paper will be discredited, especially the notes of banks, which have no security except the bank assets, a system urged by Secretary Gage and the Bankers' Alliance. The situation is hardly clear enough for present dealing with the money question by the passage of a law establishing a permanent system.

The Mexico Mine and Smelter Supply Co., of the City of Mexico, is the latest organization for supplying the mines in Mexico with machinery. The officers of the company are all old machinery dealers, and know what possibilities there are ahead of them. They are H. R. Ayres, of Denver, Colo., president; Eben Smith, of Denver, vice-president; Frank L. Smith, treasurer; John S. Cary, secretary, and Wm. M. Bushnell, general manager.

They propose to carry all kinds and classes of machinery in stock and furnish nothing but the best, and expect in a short time to have the largest machinery and supply house given to the mining and smelting trade in the Republic of Mexico.

The company is practically the same as the Mine and Smelter Suppiy Co., of Denver, Colo., as the Board of Directors of both companies are the same.

CHEMISTRY IN IRON FOUNDRIES.

The success with which exact chemical methods have been followed in the analysis and chemical tests of all raw material entering into the manufacture of pig iron and of the pig iron manufactured therefrom by all iron manufacturers during the last decade has had its good effect in a similar manner in larger iron foundries. The time has passed when guess work and rule of thumb methods can any longer be depended on in making iron castings for special purposes. Recognizing this necessity and to obviate the trouble and expense to small foundries of obtaining their own analysis and testing, the American Foundrymen's Association in session at Cincinnati on June 8th last, endorsed the project to establish a national agency for standardized iron drillings, on the plan suggested by Thos. D. West in his paper on "The Need of Greater Uniformity in Pig Iron Analysis" read at the April meeting of the Pittsburg Foundrymen's Association, who appointed a committee to take action in the matter.

COMMITTEE'S PROGRESS REPORT.

The committee appointed by the American Foundrymen's Association to establish and advance a National Bureau for the distribution of uniform standardized drillings is now able to distribute a range of samples that it i felt will meet the hearty approval and endorsement of managers and chemists employed directly or indirectly in all branches of the iron industry, pertaining to the making or use of pig iron.

The standardized samples now ready for distribution cover the following determinations:

Silicon, one each of a low, medium and high range of cast iron.

Sulphur, one each of a low, medium and high range of cast iron.

Manganese, one each of a low, medium and high range of cast iron.

Phosphorus, one each of a low, medium and high range of cast iron.

Total carbon, one determination.

Graphite, one determination.

Titanium, three determinations.

In all, 17 determinations made on four (4) samples.

The samples are designated as A, B, C and D. Sample A, wdich has been ground to pass through a 40-mesh sieve, gives one total carbon and one graphite. Sample B gives a low silicon, a medium sulphur, a low manganese, a phosphorus which is within the Bessemer limit, and a titanium. This has been passed through a 20 mesh sieve. Sample C gives a medium silicon, high sulphur, medium manganese, medium phosphorus and a titanium. This has also passed a 20 mesh sieve. Sample D gives a high silicon, low sulphur, high phosphorus and a titanium, and has passed through a 40-mesh sieve.

The drillings were obtained from castings made after the plan described by Mr. West in his paper before the Pittsburg Foundrymen's Association, June, 1898, widely published by the trade papers. The drillings were prepared under the supervision of Prof. C. H. Benjamin, and the standardizing under that of Prof. A. W. Smith, both of the Case School of Applied Science, Cleveland. The chemists engaged in standardizing the four samples are Messrs. Booth, Garrett & Blair, Philadelphia; Prof. A. W. Smith, and Cremer & Bicknell, Cleveland, O., and Andrew S. McCreath, Harrisburg, Pa.

The standards are sold at the price of $5.00 per pound, and in no instance will less than one pound be sold. The samples are packed in bottles, holding one-third of a pound and delivered in cases holding three or four bottles, according to the desires of a subscriber. One bottle each of samples A, B. C and D can be had, or a subscriber can have three or four bottles of all one sample (excepting the sample A, which contains the total carbon and graphite, and of which only one bottle will go to any one subscriber); or two or three bottles of one sample and one of another; in fact, bottles of samples B, C and D can be sent in any proportion desired, as it is the wish of the committee to follow the desires of all purchasers, as far as it is in their power. One pound of the samples should furnish enough material for 36 complete analyses, or at least 200 separate determinations. The analyses of the samples A, B, C and D will be sent separately by mail, so that they can be placed upon bottles or kept private, as desired by the subscriber.

The amount asked for these standards, considering ther cost, is very low, and the drillings such that no chemist could manufacture them for himself at many times the price. The outlay for preparing the four samples was somewhat over $400.00. Moreover, the good that subscribers can accomplish in assisting to promote greater uniformity in the work of laboratories, which have to deal with cast iron, is such that no matter to what part of the country any portion of the sample may be sent, like reports of analyses can be expected at the hands of careful chemists, who are only too often compelled to resort to short-cut methods in order to keep up with the work of their laboratories.

The undersigned committee is encouraged by the receipt of subscriptions, which include, to date, about thirty-five (35) of our leading laboratories. It is hoped that this open letter will be so fruitful of results that another year will find few, if any, laboratories not possessing the standards herein advanced. Those wishing to assist this movement to the extent of ordering standardized samples, will please address their orders to any member of the following committee:

T. D. WEST, Chairman, Sharpsville, Pa.
DR. R. MOLDENKE,
48th St. & A. V. Ry., Pittsburg, Pa.
JAMES SCOTT,
Lucy Furnace, Pittsburg, Pa.
P. W. GATES,
Gates Iron Works, Chicago, Ill.
E. H. PUTNAM,
"The Foundry," Detroit, Mich.

A Compendium of Gold Metallurgy.

The above is the title of a work published by E. M. and M. L. Wade of the well-known assaying firm of Wade & Wade, 115½ N. Main street, Los Angeles, Cal. The book is offered to the mining public, especially to those, unhappily too numerous, who possess little or no knowledge of metallurgy. It is not intended as a text book or for the making of experts, but to give a general idea of the scope and application of metallurgical processes used in extracting gold from its ores.

Chapter 1. treats of the important properties of gold, mercury, sulphurets, tellurides, quartz and silicates.

Chapter 2 gives an outline of processes and operations, also tells a few causes of the failures in working ores, while chapter 3 is devoted to the crushing and pulverizing of ores, the machinery employed, etc.

Chapter 4 contains a treatise on free milling ores, and the operation of reducing them, the mechanism in detail of the different mills used. In describing the stamp mill the following parts are observed: The mortar, stamp, the lifting mechanism, the screens and plates. being followed by a few remarks on making the clean-up, retorting and melting, and the dressing of plates. Roller quartz mills receive the attention of the authors. Automatic feeders are rightly advocated, as they produce a greater output and make a saving on the wear and tear of the mill.

Milling and concentrating tests are dilated upon.

In chapter 5 concentration is treated in detail, while chapter 6 contains an exhaustive description of the different cyanide processes of commercial importance in the following order:

1. MacArthur-Forrest.
2. Keith electro cyanide.
3. Porter electro cyanide, chloration, etc.
4. Pelatan-Clevici electro cyanide.
5. Siemens-Halske electro-cyanide.

Chapter 7 is devoted to the chlorination of ores, embracing the Plattner process, the hypo-sulphite and Russell processes, including roasting.

Smelting is reviewed in chapter 8, and a paragraph on custom smelting is added.

The book contains 128 pages and cover, is well patronized by the advertisers catering to the miners' trade, and forms a valuable adjunct to anyone's library.

THE CYANIDE PROCESS.*

Depends on the solubility of gold in weak alkaline cyanide solutions, and its recovery from solution by means of precipitants—zinc, electricity, etc. "Weak cyanide solutions have a selective action on gold in preference to the base metals." The commercial "98 per cent." salt of potassium cyanide is generally used. It is white, very poisonous, and quite soluble in water. Price in large lots, 30 to 31 cents per pound.

OXYGEN AND OXIDIZERS.

The presence of oxygen in solution is recognized as also necessary to effect the solution of gold, though the Sulman process (using bromo cyanogen) is based on the opposite theory. Oxygen derived from the air is always present in the cyanide solutions, generally in sufficient quantity. The addition of chemical oxidizers—sodium peroxide, potassium permanganate, etc.,—have been tried, but with little or no generally-recognized benefit, though claimed so in some instances.

APPLICABILITY.

The process, with its various modifications, is applicable to ores and tailings (wet or dry crushed) concentrates and slimes, which we shall call in common, *material*. The gold must generally be very fine, coarse gold dissolving quite slowly; but some of the modifications are well adapted to the extraction of coarse gold also.

More or less silver and base metals are extracted at the same time, and some silver ores are well adapted to the process, but the expense of treatment is generally too great.

The adaptability of any particular material should be determined by practical Working Tests.

INTERFERING SUBSTANCES.

Interfering substances are: Copper, (which is often difficult or impossible to treat;) antimony, arsenic, and other soluble metallic sulphides; free sulphuric acid; iron salts resulting from the oxidation of pyrites; salts of magnesia, organic matter, and other substances. The effect of these is chiefly to consume cyanide, making the process expensive or difficult. Organic matter re-precipitates the gold in the leaching vats and probably absorbs oxygen. Copper, besides consuming cyanide, sometimes precipitates excessively on the zinc (MacArthur Forrest process) more or less retarding the precipitation of the gold, especially with weak solutions. The addition of more cyanide to the solution before it reaches the zinc is a proposed remedy; also a thin coating of metallic lead produced by dipping the zinc in a 1 per cent. or 2 per cent solution of lead acetate (sugar of lead.) In this latter case the gold is said to be precipitated more completely. It is proposed by MacArthur to precipitate soluble sulphur by means of a lead salt.

Wood absorbs gold cumulatively and therefore wood chips should be kept out of the solutions, and all wooden vats holding solution should be painted with a paraffine, asphalt or other suitable paint. Free acid, iron and magnesia salts are generally neutralized with an alkali (quick lime or soda;) or, if soluble, washed out with water.

MECHANICAL DIFFICULTIES.

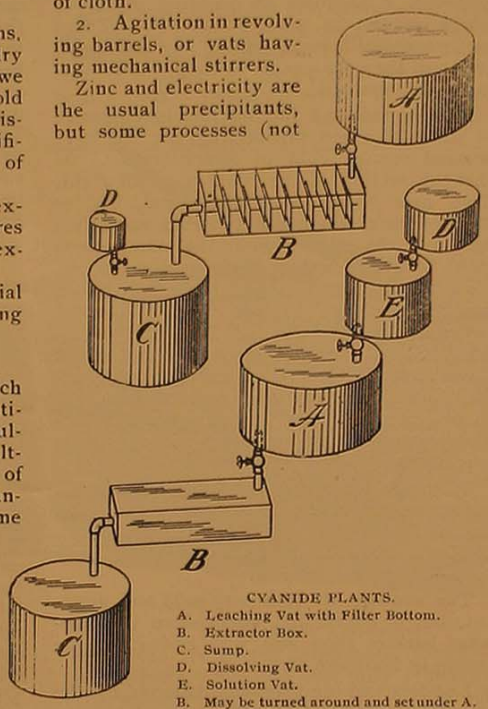
Excessive fineness, or slimy, (talcose, clayey,) condition of the material, or heavy compactness (concentrates, etc.,) retard or prohibit perco ation. Slimes, in wet crushing are usually separated by running the pulp through pointed V-shaped boxes, or into vats, arranged so that the slimes overflow, while the coarser sands settle to the bottom or pass off in to another vat. Slimes often retain considerable value, but are usually, owing to the difficulty or expense of treatment, allowed to go to waste. Their treatment in Africa is by means of agitation in circular vats with stirrers, and settling and siphoning or decanting of the solutions. Slow percolation is sometimes to advantage hastened by means of vacuum apparatus—usually a receiving barrel with a solution gauge, and an air-pump. Calcining or roasting to drive off water is sometimes advantageous.

The usual methods of application of the process are:

1. Percolation in vats with filter bottoms made of wooden slats covered with canvas (usually No. 8 ducking) and burlap, cocoa matting, etc.; or sometimes consisting of a filter-bed of coarse gravel, filled in with successive layers of finer gravel and finally sand on, top without a covering of cloth.

2. Agitation in revolving barrels, or vats having mechanical stirrers.

Zinc and electricity are the usual precipitants, but some processes (not yet of commercial importance) use instead charcoal, aluminum, or other substances. Electricity also aids solution.



CYANIDE PLANTS.
A. Leaching Vat with Filter Bottom.
B. Extractor Box.
C. Sump.
D. Dissolving Vat.
E. Solution Vat.
B. May be turned around and set under A.

THE MACARTHUR-FORREST PROCESS.

Percolation is commonly employed. The pulverized material is charged into "leaching" vats and cyanide solutions, followed by wash water, run onto its surface and soaked through until the gold, as far as practicable, is dissolved and washed out. Time required varies much—from two or three days for tailings, up to several weeks slimy or other slow percolating material.

The gold solution passes out through a pipe leading from the bottom of the vat into extractor or precipitating boxes containg zinc shavings, and than into sump thanks below. The gold is precipated on the zinc as a brownish black powder or slime, accumulating in the bottom of the box.

The zinc is gradually consumed (about 2-10 to 6-10 lbs. per ton of material) and is replenished when necessary. It is turned on a lathe from round discs of metal and should be very thin, presenting a large surface to the solutions.

A PERCOLATION PLANT.

A percolation plant consists essentially of:

1. Leaching vats—with filter bottoms and outlet pipes. Their number may be few or many, depending on the capacity of each. Usually as many are employed as days required to fill, leach and discharge one vat, the capacity—depth and width –being determined by the nature of the material and the depth uf percolation. For ores the depth is usually 3 to 5 feet, and for tailings as much as 14 feet. Some ores can be leached much deeper than 5 feet. Pipes, hose or wooden launders (troughs) are provided to turn the solutions in any desired direction.

In calculating size of vats, 100 lbs. per cubic foot of pulverized silicious ore, or tailings, free from much of heavy metallic constituents, is considered about an average weight.

2. Sump or solution vats—one for each separate solution employed They are usually made deeper and narrower, but about the same capacity as the leaching vats. Their size may be proportioned to the quantity of solution held by each, the wash water being the smallest.

Vats are made usually of either wood or iron, and round, but sometimes rectangular. Iron vats are preferable, on account of the leakage of wooden vats.

3. Zinc extractor boxes—There are generally two—one for each cyanide solution em ployed—strong and weak—and sometimes more. Usually made of wood, and varying in size from 12 to 20 feet long, 2 to 3 feet high, and 1½ to 2 feet wide wide. They are divided into compartments by means of partitions and baffle boards which force the solutions down and up through the zinc. Wire screens, suspended a few inches above the bottom, support the zinc. Plug holes in the bottom or side, or other arrangements are provided for cleaning out.

4. Pumps and pipes or hose, with power for pumping solutions.

5. Furnaces for roasting, drying, melting, etc., or small wooden vats for acid treatment of gold slimes.

6. A first-class assay outfit for testing solutions and material for gold, silver and cyanide; and scales for weighing out cyanide, alkali, etc. Assays of head, tailing and intermediate samples of the material and solutions, should be made regularly. The tests for strength of cyanide is made usually by means of a standard silver nitrate solution; sometimes more conveniently by means of starch and iodine or corrosive sublimate.

7. A competent cyanider and assayer, best with a good knowledge of chemistry. Though apparently simple in execution, and easily worked sometimes, management by an experienced chemist is nearly always indispensable to success.

Two simple arrangements of a percolation plant are shown herewith.

WORKING SOLUTIONS.

Two, and sometimes more, cyanide solutions are employed, designated strong and weak, the weak following the strong, and that followed by weaker solution or water. The weak solutions are derived from the consumed stronger solution, which ranges, say, from 2-10 to 6-10 per cent. cyanide, or more; and the weak, below 15 100 per cent. Even weaker strong solutions are used, but when too weak, zinc fails to precipitate well. The first solution is sometimes best introduced below,

*From *A Compendium of Gold Metallurgy* by Wade & Wade.

allowed to slowly percolate up to the surface, and to stand sometimes, (especially with material clayey or very fine or lumpy) in order to prevent the formation of channels, and saturate the mass. A very strong stock solution is kept on hand, from which to make up the working solutions, instead of dissolving the salt directly.

Acid ores should be given a preliminary wash with water or alkali solution, or both, the one following the other. Sometimes it suffices to put the solid alkali (lime) into the material omitting the preliminary wash.

DISCHARGING.

The leached material is usually discharged by shoveling over the sides into cars, or sometimes through bottom discharge doors. Where water is plentiful, sluicing out is practiced to advantage.

THE CLEANUP.

This is done once or twice a month, or oftener if necessary or desired. The zinc is washed free of cyanide, rubbed and washed on a wire screen over a tank of water, and the residue of zinc, still retaining considerable gold, put back into the extractor boxes. The gold slimes in the boxes are then cleaned out, added to those washed from the zinc, and the whole freed from excess of water and treated in one of three ways:

1. Dried, sampled for assay, boxed and shipped to a smelter.

2. Dried, calcined and roasted with nitre to get rid of zinc, et al., or litharge, borax and other fluxes, melted and cast into a bar; or:

3 Treated with sulphuric or muriatic acid to remove zinc, washed, dried, melted with fluxes, etc. Vats with filter bottoms and vaccuum arrangements are sometimes used for this operation, but, when time is no object, settling and decantation, or siphoning and draining in a canvas sack works well.

Breathing the fumes given off is dangerous, so hoods with draft flues should be provided to take them away.

DEGREE OF PULVERIZING.

This varies greatly, from that of very fine dust to that of walnuts. Usually No. 30 mesh gives good results. The rule is, fine pulverizing for hard, compact, and coarse crushing for soft or porous ores. The "size of pulverizing," or the number of screen, means nothing in themselves, unless other conditions and the relative size of the various particles of the material are considered.

Rolls, stamps, ball pulverizers, etc., are all in use for the dry pulverizing of ore, but rolls seem to be the more satisfactory, being generally considered to give a more uniform product, and creating less dust.

LABORATORY TESTS.

Laboratory tests for adaptability to treatment is no simple assay, as many think, but generally should consist of the most, if not all, of the followiug tests, viz., for:—

1. Acidity of the material and effect of alkali in reducing consumption of cyanide,
2. Strength of cyanide best suited. and consumption of same.
3. Time required.
4. Size of crushing suitable.
5. Depth of percolation permissible.
6. Assays of head, tailing, and intermediate samples of pulp and solutions, taken daily or oftener, for gold, sometimes for silver also, and for cyanide strength
7. A chemical analysis, either partial or complete, of the ore or working solution, may be necessary or advisable.
8. Zinc orelectric precipitation of the gold might also be necessary or advisable, as a confirmatory test.

Several days or a week or more may be required for a proper performance of the tests.

CORRESPONDENCE

BRITISH COLUMBIA.

ATLIN CITY, B. C., Jan. 17, 1899.

EDITOR JOURNAL:—There is a good deal written and said about this country, and still there is hardly anything known about the possibilities of this section. We are not isolated in an inaccessible place like Klondike, as the trail to Lake Bennett is kept open all winter. This place is all hustle, and the town is rapidly assuming the appearance of a typical mining camp. A great number of business houses are being erected. There is, however, a shortage of building material, which retards the work somewhat. There are two sawmills here running day and night, and still they are unable to supply the ever-increasing demand.

It is too cold and the weather is too severe to admit of much prospecting, but we have secured enough gold to demonstrate to us that this section of the country is all right. Two new creeks were discovered, besides McKee creek, which was reported some time ago, and the miners wintering along them think a great deal of their gold resources. Numerous claims have been located on Moose and Sheep creeks. Moose creek is twenty-five miles below here and flows into Atlin lake. Sheep creek empties into the end of Taku Arm. New streams are continually being found, and pay dirt secured from all. This section will hardly be recognized by former locators when the next mining season commences.

There are ten or twelve inches of snow on the ground at the present time hereabouts, but in the higher places, at the sources of McKee and Spruce creeks, the snow is quite deep—seven or eight feet.

The weather has been very mild and pleasant, but of course the atmosphere is somewhat harsher than one will find it in the spring in Southern California.

I understand the revenues collected by the Canadian government from the American goods which entered the domains of Canada at Log Cabin en route to Atlin is something enormous. Nearly fifty thousand during the month of December. There are ten men on the Atlin boundary and practically none of the goods dutiable escape their vigilance and it is known here that the customs staff on the boundary will be reinforced and five or six more men will probably be put on when the rush of prospectors starts in. There has been considerable difficulty here in regard to locating claims. Numerous prospectors thought they were in the Northwest Territory and staked off 250 feet, whereas they were in British Columbia and entitled to only 100 feet. Next June 1st, when the closed season ends, this matter will be taken up and adjusted. It is probable that the men who staked the claims will be permitted to hold 100 feet of them, and the remainder will be thrown open to others.

The regular closed season here lasts until June 1, and has no effect upon the rights of prospectors. It is a protection for them, as during that period there can be no interference with the property they have recorded and they are permitted to leave the district to get their supplies or for other purposes.

More anon. SOU. CAL.

CALIFORNIA.

Great Progress Noted.

Within a radius of ten miles in the central portion of the Slate Range are many rich claims which are being rapidly developed, the foremost being the Dean mine, situated at the base of the mineral belt. This company has employed over twenty men since commencing operations. A ten-stamp mill and cyanide plant is in operation, running twenty-four hours daily, the ore milling from $60 to $80 per ton. Water has been developed sufficient to run the mill.

An assay office is now being built which will be a great help to the numerous prospectors here.

About two miles east of the Dean mine is the Merideth, which has been incorporated by the Slate Range Quartz Mining Co. During the past year extensive developments have been in progress, over $20,000 having been expended in tunneling, road building, developing water and erecting a five stamp mill. The ore is of a high grade, ranging from $100 to $300 per ton. Most of the ore has been shipped to the smelter, several carloads having been shipped of this grade. A vein of white honeycomb ore has recently been uncovered which promises rich returns in free gold.

The Royal Flush Mining Co., under the supervision of W. C. Ross, have begun work on the Royal Flush mine in Leighton canon, situated one and a half miles south of Dean's mine. Assays from this mine have ranged from $49 to $80 a ton.

Leighton canon opens into a large basin which holds the principal water supply of Slate Range. Water in abundance is found at the depth of eight feet.

Two miles south of the Royal Flush mine is a group of claims with mammoth ledges but ore of low grade, from $8 to $50 a ton. There is water on one of these claims sufficient to run a ten-stamp mill. The Mullen Brothers, mining experts from Montana, are interested in these claims, which are being rapidly developed. Either a mill or dry crusher with cyanide plant will be shortly erected.

South of this group are numerous mineral-bearing hills yet undeveloped.

In the Stringer district at the north end of the range the ore assays high but the veins are small.

The Norval mine, in this district is down over 100 feet and they are taking out satisfactory shipping ore.

San Francisco capitalists are erecting an extensive borax plant on Borax Lake about a mile west of the base of the range. This company have sunk a well 125 feet near the base of the mountains and have erected a large windmill to supply fresh water to the refinery. At present they employ from ten to fifteen men, but more will be put to work as soon as the plant is completed and in operation. A general merchandise store has been opened just below the Dean mine by Mojave parties.

A mailing and staging station has been arranged for. The stage will run through Leighton canon, a natural road through the range—stage running from Johannesburg to Ballarat, Panamint range.

C. A. BAILEY.

JEFFRFY T. M. 110 ELECTRIC LOCOMOTIVE.

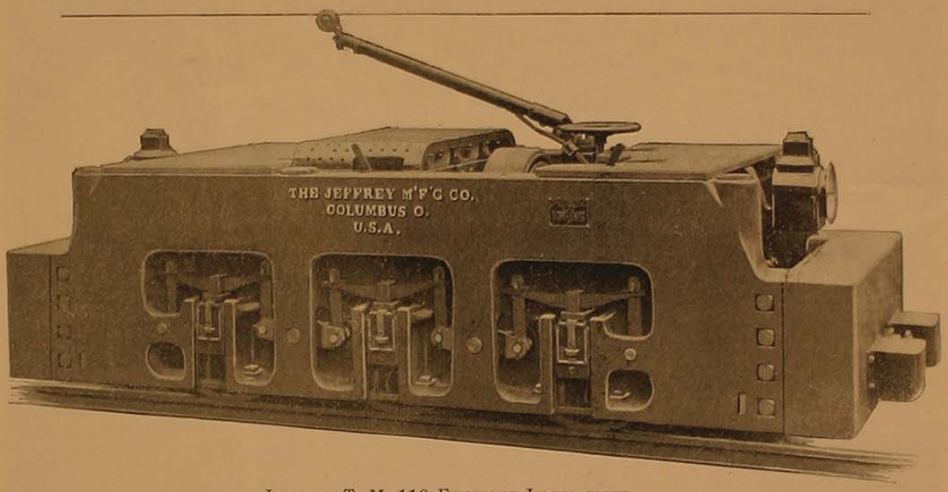
One of the latest locomotives designed and put upon the market by the Jeffrey Manufacturing Company, of Columbus, Ohio, is known as their T. M. 110 electric locomotive, a cut of which is shown on this page A number of these locomotives have already been put into service and the results obtained by their use have demonstrated the advantages of this form of construction where large quantities of material have to be removed over a considerable length of track.

The first electric locomotives used in connection with mine work were very light; but the manufacturer has been building them heavier and heavier each year, as the work they were called upon to do was increased. Mines where these lighter locomotives were originally installed have advanced farther into the veins and at the same time increased their output, consequently these light locomotives have not only had longer distances over which to travel but the loads behind them have been constantly increased. The locomotive we show in the cut is a distinctively new type and the heaviest and most powerful locomotive for mine and surface haulage which has ever been built and put in successful operation. The weight of the machine is fifteen tons and in getting this weight the most essential feature of such locomotive has not been lost sight of, that is compactness Not only has this idea been kept closely in mind by the manufacturer, but the other important improvements in electric locomotive design and construction have been conspicuously developed.

The distribution of weight in the design of a locomotive will determine largely the size rail upon which it is necessary to operate it and therefore effect to a large extent the cost of laying track. Few mines in this country are equipped with rails weighing more than 35 lbs. to the yard. If the weight of the locomotive is distributed uniformly on its drivers and the number of drivers is sufficient to insure a comparatively small total weight upon each, then the wear and tear upon the track will be minimized, In all the heavier locomotives built heretofore, it has been the custom to use four drivers, but in the T. M. 110 Jeffrey electric locomotive three sets of wheels and axles are used, making six drivers in all, upon which is distributed the weight of the locomotive, thus each driver is called upon to carry only ⅙ of the weight instead of ¼ as would be the case in the common design of a four driver electric locomotive. The frame of the locomotive is mounted on equalizing springs arranged on the four point suspension system. The method of spring suspension allows adjustment of the wheels to the irregularities in the track. By this arrangement a proportionate amount of the weight is at all times distributed upon each driver and consequently you obtain the maximum tractive force continuously. Not only is this advantage gained by such mounting of the frame but by thus distributing the weight less wear and tear is occasioned upon the track and lighter rails can be used. The vibrating or pounding effect upon the track is entirely overcome. All of the points are most essential as they determine very largely the cost of installation and operation of an electric haulage plant. On account of the middle axle being fitted with smooth faced drivers instead of flanged wheels it is possible to operate this form of locomotive on tracks where curves of small radius are frequently encountered. On each one of the three axles is mounted a motor of proper size and capacity and by thus distributing the power among three motors it is possible to build a locomotive for a much narrower gauge without sacrificing either efficiency or simplicity.

It would be very simple to build powerful motors for electric locomotives if such locomotives were operated on standard gauges of surface roads. The frame is of the best gray iron casting securely fitted and bolted together with turned bolts and reamed holes.

The wheels are of the best chilled gray iron, this form of wheel having been found more serviceable and economical for electric local motives in mine use, than the earlier type of tired wheels. These wheels are mounted on axles of hammered steel accurately turned.



JEFFREY T. M. 110 ELECTRIC LOCOMOTIVE.

The motors are of the multipolar, ironclad type completely enclosed and fully protected by the motor casing. They are waterproof and of a type admirably adapted for this class of work.

The controlling mechanism is one of the features of superiority in the Jeffrey locomotive, the number of steps in the controller being sufficient to admit of the starting of a loaded train at a uniform acceleration without jerking. In connection with the controller is a series-parallel switch, which will admit of the motors being run either in series or parallel according to the speed at which it is desired to move the load. All these parts together with a reversing switch and sand box levers are conveniently located so the operator can handle them without difficulty. The operator's seat is located in the center of the car between the axles where he is fully protected from injury in case of accident. The trolley pool can be located on either side of the frame of the locomotive. The sand boxes are cast in the frame and the supply of sand can be regulated by a positive motion operated by levers. The brake is of the automatically locking equalizing screw type of such strength that the drivers can be slipped, if necessary.

The top of the locomotive is covered, over its entire surface, save the operator's so that water dripping from the mine roof, falls of slate, and other foreign substances are not permitted to fall into the working parts. This whole top is so hinged that it can be easily remsved when it is necessary to gain access to any of the motors gears or other parts of the machine. There are only three pinions and three split gears on the machine. The pinions being keyed to the armature shaft, the split gears being keyed to the axles so that there is no power or energy lost in consequence of intricate gearing. The construction of the locomotive as a whole is of the utmost simplicity, consisting as it does of the wheels axles, frame, three motors, and controller; each part being readily accessible without the removal of any of the other parts.

The Jeffrey Manufacturing Company build electric locomotives of all sizes and for all purposes, their locomotives being in use in every industrial line. They have recently gotten out a very handsome catalogue in which they show cuts and descriptions of their locomotives, which catalogue will be very helpful to any one interested in the economical handling of material about mines of all kinds, smelters, manufacturing plants, coal yards, etc. Such catalogue will be mailed to any address upon application to The Jeffrey Manufacturing Co., Columbus, Ohio, U. S. A.

The Tuolumne *Independent* of January 7th, publishes a full account of the horible disaster at the Jumper mine, in which four men met death by the falling of a skip from the 600 foot level to the bottom of the 775 foot shaft, caused by an act of carelessness or negligence on the part of the engineer. Together with the account of the accident the paper publishes an article by Chas. L. Lang. "The Responsibilities of a Hoisting Engineer and Some Needed Legislation", from which we make the following extracts and heartily endorse them:

"For the safety of our mining public and in the interest of true economy and business success it is essential that none but good engineers be employed in the mines of California. All engineers should be licensed; none but competent men allowed such license. These men should also receive higher wages than is commonly paid in this State. Mines and hoisting works, boilers and machinery should be under the jurisdiction of a State Mining Inspector."

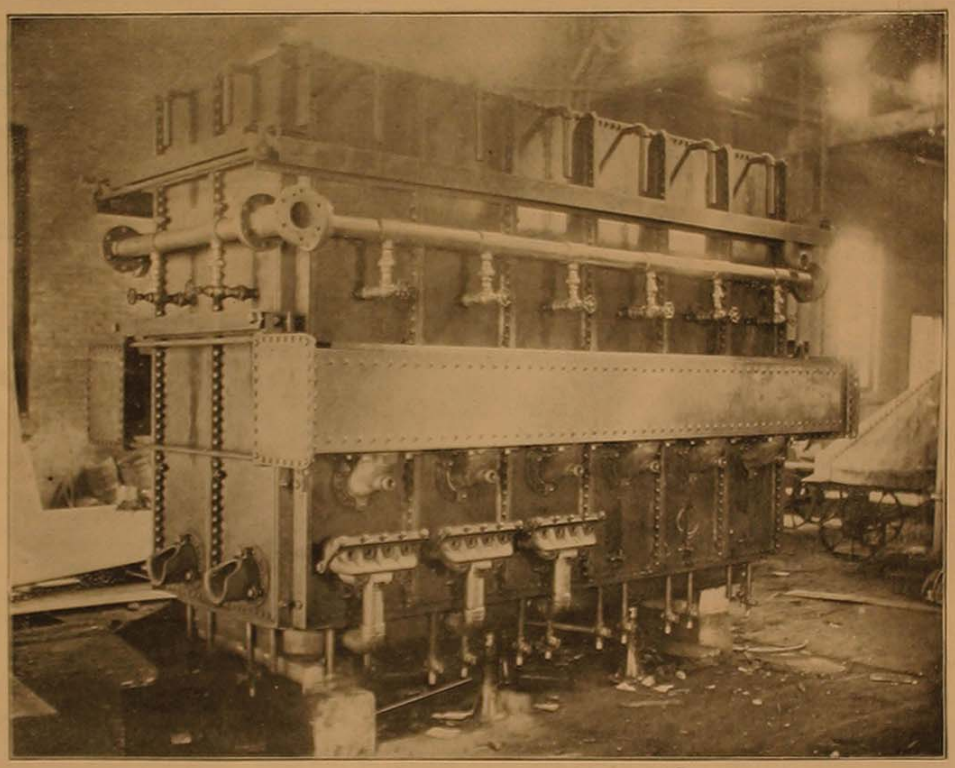
"None but the safest hoisting machinery should be used and made of good material. The old-fashioned clutch engine should be thrown on the scrap heap and its use made a State's prison offense. Twenty per cent. of the hoisting accidents and usually the most fatal ones are caused by the use of the lever-clutch. Friction clutches are now made safe and perfect in action and there is no excuse for using the obsolete dangerous kind."

THE GARRETSON FURNACE.

The theory of pyritic smelting as elaborated by Hollway was nearly perfect, and gave very great promises, but the carrying out his process has been so unscientifically attempted, with such poorly designed apparatus, that pyritic smelting has been referred to as an "irrisdescent dream." Yet it is true that there are several pyritic furnaces running, and the ore has been made to smelt itself, rapidly, and cheaply without the addition of carbonaceous fuel. But the matte was low grade, so from an economic standpoint, the results were not satisfactory.

Again, ores have been smelted with carbonaceous fuel, that contained within themselves an abundance of fuel for their own treatment, if the apparatus had been so constructed that all the available fuel contents of the ore could have been utilized. But the apparatus was so constructed that the carbonaceous fuel was first oxidized, the sulphide melted into a low grade, thus entailing the cost of further treatment and robbing the furnace not only of the best part of the fuel originally contained in the ores, but of the iron needed to slag the silica of the charge, where the same carries an excess of silica.

The three operations, roasting, smelting, and converting, carried on in a single furnace, reducing the cost of installing a plant to treat a given amount of ore, and reduce it to the metallic state, costing about one-third of what it would to build roasting appliances, a smelting furnace, and a converter or bessemerizing plant, is what the Garretson Method of Combined Smelting and Converting Sulphide ores has accomplished.



GARRETSON FURNACE CAPACITY 250 TONS PER DAY BUILT FOR COMPANIA METALURGICA MEXICANA SAN LUIS POTOSI, MEXICO.

With this furnace, and a hot blast apparatus which recovers the heat from the slag, ores carrying sufficiently high percentages of sulphur, iron, arsenic, etc, can be smelted and converted into copper bottoms or black copper, at one operation, without the continued use of any carbonaceous fuel in the furnace, thus carrying pyritic smelting to perfection.

These improvements combine pyritic smelting, and continuous converting in a water-jacket furnace. The mattes as fast as produced, are reduced in the furnace to metallic copper carrying the precious metals.

The mattes all being converted within the bottom of the furnace, the heats generated in pyritic smelting and in converting, are both made available to smelt the ores; thereby taking a marked step in advance of pyritic smelting alone.

The furnace is so constructed that the molten matte is constantly flowing into the converting compartment, thus continuously supplying fuel to the charge being converted, thereby enabling the metallurgist to maintain sufficient heat while converting in a water-jacket furnace.

In smelting iron and copper pyrites, gold bearing quartz or other siliceous ore can be charged into the furnace, just as they come from the mines, and all their values recovered, while their silica combines with the oxide of iron to form a fluid slag. That under the bessemer process could be formed only by the destruction of the more expensive converter linings.

In this furnace a portion of the charge may consist of heap roasted ores, so charged as to prevent it from sticking to the walls, and to allow the free escape of the waste gases, thus obviating one of the principal difficulties experienced in running some ores through pyritic furnaces.

The furnace in its simplest form, as designed to treat sulphide ores carrying copper, gold, and silver, is a single stack, water-jacket furnace, long in proportion to its width, arranged for two pressures of blast, the whole being so arranged and operated that copper may be tapped from one end, while more than ordinarily clean slags run continuously from the other end.

When constructed as a lead copper smelter, to treat more complex ores, advantage is taken of the specific gravity and the affinities of the molten products, to separate the copper from the lead, bismuth, etc. The smelting is so conducted that the lead, and bismuth, are first reduced to the metallic state, and settle to the bottom of the furnace and are drawn out without the loss of a large part of them by volatilization as in copper smelting.

The copper and iron having a greater affinity for sulphur and the sulphides being of lower specific gravity, float into another compartment of the bottom to there be converted, the copper to the metallic state, the iron to oxide, and then to a silicate of iron which flows away as a fluid slag, the sulpher flying away as an acid gas.

When constructed as a pyritic smelter, a hot-blast apparatus is added, which extracts, practically, all the heat from the slag and returns it to the furnace in the btast.

This apparatus makes a great saving in fuel by recovering the heat from the slag, and handles the slag mechanically, discharging it, without hand labor.

In the Garretson Furnace as designed to treat copper and iron sulphide ores carrying the precious metals, the following description will suffice.

The brick off-takes above the floors are supplemented and strenghtened by water cooled side pieces that enclose water-cooled doors that can be raised, lowered, or removed, when repairing furnace. The smelting blast which should be heated for economic work and especially so for pyritic smelting, enters through a large pipe at one end (which may be lined with non-conductive material) and passes in through the tuyeres above the slag line in the ordinary manner. The bottom of the furnace is made hollow, and the converting blast passed through it more for the purpose of cooling the bottom, than for heating the converting blast which enters the bottom from below and passes to the left, around the manhole under the entire bottom of the furnace. A water jacket dam divides the high-grade matte and copper from the low grade matte which as fast as produced flows over the dam and is there converted to high-grade matte and then to metallic copper that settles to the bottom and carries precious metals down with it. The slags that are formed in the converting end of the furnace are necessarily rich, too rich to draw off and throw away, but as they flow to the right over the low grade matte, and are bathed in the shower of falling low grade matte, they give up their values to the sulphur, and escape as more than ordinarily clean slags, siuce they are made to pass through a region where unroasted ores are being smelted low grade matte is being produced. Any of the matte that may be swept out of the furnace with the slag settles to the bottom of the tightly covered settling pot and can be drawn out and returned to the furnace. The blast being trapped, to prevent its escape, the pressure of the

blast drives the slag up and out of the spout.

The furnace rests on brick or stone walls built across the ends of the foundation which gives it solidity, the central portion being supported by five jack-screw columns. The central screw supports a man-hole bottom. The iron floor above rests on and is secured to the top of the jackets. The jackets are securely bolted together, and the large bustle pipes on each side, made of channel bars and boiler plates, and the I beams that surround the furnace higher up, act as braces to hold the jackets in proper position. The furnace has all the necessary water inlets, outlets, and provisions for cleaning the jackets, and the necessary openings and spouts for tapping all the molten contents. The furnace is provided with the ordinary smelting blast and also a converting blast under a pressure of five or six pounds to the square inch.

The furnace is operated by charging the ore into the middle and one end of the furnace, with the required flux. Ores carrying a sufficient excess of silica to satisfy the iron of the matte that flows over the dam, are charged into the other end of the furnace over the converting tuyeres.

The smelting and converting blasts are designed to be so regulated that the mattes are reduced as fast as they are produced and flow over the dam: thus maintaining the matte at a uniform height in the furnace.

The bottom of the column of silicious ore at the end of the furnace is forced down through the slag into and in contact with the matte, so that as each atom of iron in the matte is oxidized by the converting blast, it comes in contact with an atom of silica, when they unite and form a light fluid slag that rises and flows away, leaving the remaining silica free to unite with other atoms of iron in in the oxide of iron being formed.

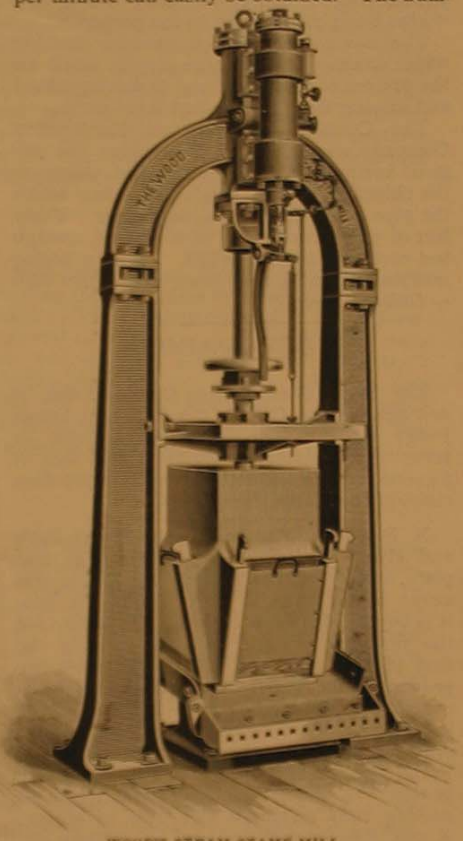
THE WOOD STEAM STAMP MILL.

The Wood patent steam direct actuated stamp mill, illustrated herewith, is the latest in this class of departure from old mechanical methods to enter the mining field. At the Mammoth mine, Yavapai county, Arizona Territory, this mill reduced 112 tons of very hard quartz to 40 mesh in 342 hours, or 7 tons an 1,720 pounds each 24 hours, which is more than equal to the product of three heavy gravity stamps. The report further states that the mill in every other respect did splendid service, and says: "Considering the hard, tough character of the ore, and the fact that we have no ore crusher, the capacity is very satisfactory. On gold ores of average hardness, we should judge the capacity to be from 8 to 15 tons per day."

The design of the mill is pleasing, it has the appearance of substantiality, durability, and merit. The frame is mounted on the foundation separately from the mortar, a specially heavy one designed for receiving very heavy blows. This is an admirable feature of the mill, as vibration is not imparted to the frame and steam operating members. The adoption of this mortar certainly insures a much longer life than if the frame and mortar were rigidly fastened to each other. Three sides of the mortar are employed for screening purposes, and enable ample exit for the pulp which flows, after its discharge, upon an apron mounted on the mortar. Excellent provisions have been made in regard to mortar amalgamation, features which have afforded highly prized results. The engine, or cylinder, with its valve mechanism and arching portion of the frame, is adjustable in height to the two upright stands by blocks or shims, in order to accomodate from time to time the wear of the shoe and die. The stem, or in this case the piston-rod, the piston-head, "boss-head", and shoe, weigh about 550 pounds, and according to the drop, or the length of the direct stroke which may be regulated at will, the work of three 1,000-pound gravity stamps is the result. The diameter of the shoe is 8 inches, the rod or stem 3⅜ inches, and the piston head 5½ inches in diameter. From 60 to 75 pounds of steam pressure will operate the mill, or compressed air can be used with advantage when obtainable.

The valve mechanism consists of a simple piston valve operated by the means of a tappet on the stem, engaging a bell-crank lever as the stamp stem reciprocates, alternately opening and closing the ports. The action is similar to an ordinary engine.

The reciprocation is rapid and 200 blows per minute can easily be obtained. The number, however, is largely governed by the ability to keep the die thoroughly covered with material. The mill is absolutely grease proof, a feature in which all mill men are interested. The ore is fed automatically by means of the Wood ore feeder, a simply designed feeder for both dry and wet ore feeding.



WOOD'S STEAM STAMP MILL.

A number of these new direct steam stamp mills are now in the course of construction in the builders' shop, the E. P. Allis Company, Milwaukee, Wis., for the owners and distributers, H. A. Newkirk & Company, Chicago, Ill.

The old time gravity stamp, with pounding cams is destined to have a competitor in the field, for in many cases a portable mill, so easily moved and set up again will furnish great convenience to the miner. Total weight of mill is 4,000 pounds and may be so divided in weight of parts as to permit of easy transportation.

Miscellaneous Mining News.

ALASKA.

Rich Quartz Ledge.

Tony Labbish and his companions have struck the richest thing yet discovered in the way of quartz near Skagway. The ore brought in from the lead, which is over 30 feet wide, fairly sparkles with the bright shining metal. The rock is partly decomposed quartz, and from samples shown will undoubtedly be very easy to work. No assay has been made of the samples, but those competent to judge say the ore will not assay less than $300 to the ton.

The discoverers say that a blast put in on the face of the mountain would throw down thousands of tons of this rich rock, and as it is their intention to send several samples south to prominent assayers, they will immediately return to the prospect and then pack in quite a quantity of the ore and send it below as quickly as possible. They claim they can easily reach their discovery in one day with an ordinary pack on their backs.—*Alaska Mining Record.*

ARIZONA.

Messrs. C. E. Udell and D. J. Dwyer are credited with having effected the sale of the copper property, consisting of twenty-seven claims in the Helvetia district, Pima county. The property was owned jointly by Messrs. Hughes, Lavery & McGovern. The purchasers are the Calumet & Hecla Company of Chicago, through a member thereof—James B. Sager. The consideration was $50,000, of which $5,000 was deposited in the Consolidated National Bank of Tucson.

Epes Randolph and E. S. Ives have purchased C. E. Elchelberger's interest in the King of Arizona mine. The consideration was not made public. Preparations are being made to work the mine on a large scale. Mr. Eichelberger was the discoverer of the mine two years ago. His partner, Gleason, sold to Messrs. Randolph and Ives his interest for $100,000.

CALIFORNIA.

AMADOR COUNTY.

The management of the Amelia mine at Jackson has encountered the ledge at the 800-foot level of their shaft, having crosscut from the shaft, says the Amador *Ledger*. At present they are engaged in drifting south toward the old shaft in Muldoon's field, in which shaft, at a much less depth, the ore is of better quality than it is where it was encountered recently.

The new engine at the east shaft of the Kennedy property in Jackson, has been put in operation for the first time. Sinking will now be prosecuted as vigorovsly as men and machinery can do it.

The reopening and enlarging of the Lincoln shaft at Sutter creek has progressed to the 800-foot level, and a contract is to be let immediately to sink the shaft 200 feet deeper.

CALAVERAS COUNTY.

Cross-cutting has been commenced on the 300-foot level of the Demarest mine, near Fourth Crossing.

The foundation for the ten-stamp mill to be

erected at the Ford mine is nearly completed.

Kane & Garnett have bonded the Big Four quartz mine adjoining the Thorp, at Fourth Crossing.

A new shaft is being sunk on the property of the Fort Wayne Gold-Producing Company, which is situated near the County Hospital. The machinery has arrived and is being put in place.

EL DORADO COUNTY.

The Havilah, now known as the Nashville mine, about eight miles from Placerville, is said to have been the first gold-quartz mine operated in California. It was worked by Col. Chilton in 1849, with machinery brought across the Isthmus.

Work in the new tunnel at the Unity mine, Webber Creek district, is being vigorously prosecuted. The tunnel is now in 240 feet. The company expects to strike the ledge within another 100 feet, tapping it at a depth of 250 feet. J. Eddy, late of Grass Valley, is now superintendent of this property, which is one of the group owned by the Pine Hill Gold and Silver Mining Company of San Francisco.

KERN COUNTY.

The Yellow Aster mill is fast approaching completion. All the work now to do, or nearly all, is under cover so that storms or rain will not seriously interfere with the work. The boilers are set, the engines are now being put in place, the batteries and mortars are in and the last of the stamps put in. Every day now adds much to its condition.

The Eureka mill crushed 30 tons for the Wedge Co., a few days ago which went $100 per ton.

A good strike has been made in the Baltic, located between the G. B. and Gold Coin, and a night shift is to be put on tonight.

The Hard Cash mill is making about a ton of concentrates per day. This means they are crushing about twenty five tons of ore per day. Everything is working very satisfactorily, and the company have bought a new crusher, and expect to double their capacity in a short time. One assay made on the concentrates showed $243 per ton. At this rate or near it, this is a mighty good proposition.

RIVERSIDE COUNTY.

The O. K. mine, at Virginia Dale, is turning out some good ore. From a twenty days' run in their little two-stamp mill, Messrs. Ingersoll & Esler, the principal owners, cleaned up 100 ounces of gold, valued at $1,700. There is about 800 feet of work done on the mine; a shaft, 180 feet deep, and the rest in drifts, all in good paying ore. With this amount of work done, one can hardly say the mine is developed. There are only six men employed by the O. K. Company, three in the mine and three at the mill.

Jos. Arbois, of Virginia Dale, has a good mine in the Leon. He is now working a gang of men developing and extracting the ore.

The Brooklyn, owned by H. B. Botsford, is another first class property. Ore from this mine is being milled at the Reitz & Sherman mill with great success.

Furguson's mill is handling the ore of the celebrated White Star mine, while Meacham's mill is working the ore produced by the Noble Grand mine.

John G. Burt, one of Virginia Dale's old timers, has a force of men at work on his properties prosecuting development work. Mr. Burt has some first-class mines.

SAN BERNARDINO COUNTY.

J. L. Campbell filed a big water location for record, says the San Bernardino *Free Press*. The claim is located in middle fork, Lytle Creek, and appropriates 1,000 inches therein, and is to be used for generating electricity and mining machinery, for the compressing of air to be used in transmitters. The location was made Jan 5, 1899.

TUOLUMNE COUNTY.

The Arbona and Gagnere mines have resumed operations with large forces.

Bob Dull and partner have struck a good prospect in their pocket claim on Jackass hill.

The work of pumping out the Bonanza shaft was begun recently.

The Street & Cross mine, near Tuttletown, was started up this week. Miners are engaged in straightening out the shaft, which is down over 100 feet, and when this is accomplished sinking will be resumed. A new road is also being constructed to the property.

The Black Oak mine is running steadily under steam. In the mine proper, work for the present is being confined to driving ahead and stoping from the 800 foot level north.

The Columbia Gravel and Exploration Company was forced to discontinue the original boring at a depth of 220 feet, owing to the chipping of the hole's rim, after which the pipe could be driven no deeper. Forty feet of pay gravel had been passed, though bed-rock was never reached. A new boring was started and is now down over sixty feet. —*Union Democrat.*

COLORADO.

The Matoa Gold Mining Company won its suit against the Cripple Creek tunnel before Judge Hallet The judgment resulted in favor of the Matoa Company in the sum of $30,000, for ore extracted from the Gold Pass claim of the Matoa Company.

N. B. Bailey, president of the Eldora Bank and also of the chlorination works at that place, states that the outlook for Eldora was never better than at this time. In fact, it is beyond his expectations. He states that the new $75,000 mill will be running the first of February, and will be the most improved in the West. In fact, it will be as complete as money can make it. One of the improvements will be that everything will be crowded into less space than is usually allowed for such a plant. The ore, after being heated, will not have to be carried so far for cooling, thus making a nice item of saving. A new scheme will be tried in settling the dust which contains particles of gold. This dust will be gathered into bricks and sent to the smelter. This is an important item of saving, as is shown by the fact that the Colorado-Philadelphia Reduction works have 150,000 bricks on hand at this time, which can be sent to the smelter at any time.

Vindicator Election.

At the annual meeting, at Denver, of the Vindicator Gold Mining Company, the following officers and directors were elected: President, F. L. Sigel; vice-president, G. S. Wood; secretary and manager, F. A. Campbell; treasurer, Adolph J. Zang. These gentlemen compose the board of directors. Outside of the election of officers little business of importance was transacted.

The main workings of the Pharmacist mine steamed up on the 11th inst. For several days yet operations on this part of the property will be confined almost entirely to cleaning up the mine. When work is begun in earnest, the first move of the lessees will be to sink the Jones shaft about twenty feet, and connect it with the eighth level of the old workings of the mine. This will be at 560 feet depth. A three-shift force is employed. J. S. Murphy, who made a mine out of the Isabella Company's Smuggler, is a part owner in the new lease in the Pharmacist and is in charge of the work. The lease runs 5 years.

Cripple Creek Doings.

The New Zealand Mining Company, owner of the Deadwood, Pauper and New Zealand claims, on Bull Hill, besides valuable shares in the Garfield Consolidated and other mining companies of the camp, has been practically absorbed by the Consolidated Gold Mines Company. The latter company, already owner of the Wild Horse, a new shipper on Bull Hill, recently purchased 325,000 shares of the New Zealand Company in one block, this being the controlling interest, and now owns a large proportion of the capital stock. The Consolidated Gold Mines Company has also secured from E. H. Newland the lease on the Deadwood recently purchased by him from Heaton and Cleveland. This lease has been equipped with an electric hoist, the shaft house has been remodeled and a commodious ore house has been erected. The property was connected with the main office at Victor by the private telephone line, which also runs direct to the Wild Horse mine. The Deadwood is being rapidly placed in shape for heavy production, and at the same time is making small shipments. The Pauper and the New Zealand are being worked by lessees. The Wild Horse, the first acquisition of the Consolidated G. M. Company, is shipping about 25 tons daily, and promises with increased development to become one of the heaviest producers of the camp. The New Zealand Company's interest, therefore, may be included in the list of the Woods Investment Company's properties, inasmuch as the latter concern is the largest owner of the Consolidated Gold Mines Company.

IDAHO.

Geo. Baker sold a one-fourth interest in the Hottentot recently to D. Stussi of Rossland, B C.

John Rankin has sold his interest in the Brucklin claim at the Hump. Total consideration is not known, but there was a large cash payment.

At least thirty transfers of mining property have been made in the last ten days, both in the Hump and upon Rapid river, the majority bringing good money.

Ed Heitsman refused an offer of $25,000 for the Winslow the past week. He is confident he has a mine and wants to do more development work before he parts with it.

Wm. Swanson, superintendent of the Iron Crown mine of Newsome creek, says the property is producing good pay. The ore that was being crushed when Mr. Swanson left the mill yielded $100 per ton. The Iron Crown is now a dividend payer. The estimated net returns for December are $10,000.—*Florence Miner.*

KANSAS.

Galena Notes.

Smith & Co. are building a new mill on their lots on the Mastin ground.

Green Beasely, who is operating a 20-acre

lease of the Bloomington land north of the cemetery, was over last week to see how operations were progressing on the ground.

The frame work for the new mill on the lease of the Meredith Bros. was completed this week, aud the work of construction will be pushed as fast as possible from now on.

The Webb City Iron Works are also putting up a 75-ton mill for Warren Bros. on their lease on the Mastin ground, but it will probably be six weeks before the mill is completed and ready to run.

James Luke & Co., who bought the Ladies' lease, are rebuilding the old Hedges Bros. plant.

MINNESOTA.

At the annual meeting of the stockholders of the Alice A. mine, held in the Keystone block, Duluth, Minn., J. S. Hillyer was elected president, Dr. Carl Corson treasurer, and Henry C. Clark secretary.

The directors elected for the ensuing year are: J. S. Hillyer, J. M. Gray, George E, Morrison, Dr. Carl Corson, M. A. Murphy. Henry C. Clark and George H. Hillyer.

MICHIGAN.

It is said the Victoria Mining Company, organized in Boston, has raised $700,000 in cash, for the purpose of re-opening the Victoria, or Forest mine in Ontonagon county. The Ontonagon Land and Copper Company is organizing in Houghton, with $600,000 cash, to re-open the Sheldon and Columbia mines located there.

Ore Rates for '99.

Contracts for carrying ore from Duluth to Lake Erie ports during the season of 1899 were made at Cleveland this week for sixty cents per ton. This is less than was expected by ore men. The big boats account for it.

MISSOURI.

The Shelaon Mining Co. on the Kohinoor lease of the Empire ground, are building a new one hundred ton mill on their lease of three lots and a fraction. They are drifting at 150 feet on a 25 foot face of rich ore, and will rush the mill to completion as soon as possible. The mill is being built by day labor under the supervision of Tom Tarr. The power will be furnished by a 100 horse power boiler and 60 horse power engine. They will put in a 16 inch crusher, three sets of rolls with five and six cell steam jigs. The company is composed of Frank P. Anderson, S. A. Wright, of Nevada, and John Dermott, of Webb City.

MONTANA.

Gilt Edge Company Incorporated.

The articles of incorporation of the Great Northern Mining and Development Company, the operators of the mines and mill at Gilt Edge, have been filed with the county clerk of Fergus county. The company is incorporated under the laws of New Jersey, the capital stock being $250,000, divided into 2,500 shares of $100 each. The paid-up capital is $5,000, subscribed by the following persons in amounts as stated: Walter B. Devereaux, of Glenwood, Col., one share; Cortland Betts, of Morrison, N. J., one share; Albert R. Ledoux, of Cornwall-on-the-Hudson, N. Y., 496 shares; Albert Mabatt Smoot, of Elizabeth, N. J., one share; Joseph E. E. Bullen, of New York City, one share. The resident agent and manager is E. W. King, the popular engineer, who for months past managed the properties at Gilt Edge.

NEVADA.

Comstock Pumps.

In a few days the pumping of the lower levels of the Comstock will begin. The pumps have arrived at the Consolidated California and Virginia mine, and the heavy standpipes for delivering power and carrying off the water have arrived from Pittsburg. The pumps will not take many days to set, as the apparatus is simple and has few working parts. Two pumps have been sent, so a reserve pump will be at hand. Duplicate elevators have also been supplied. The shaft is repaired and the drain boxes connecting the shaft with the Sutro tunnel are in place. This flume is forty-four inches high at the shaft and twenty-two inches at the tunnel end, and is 2900 feet in length. Pumping will begin at the 1750 foot level and continue to the 2800 foot level, or 1050 feet below the sill of the Comstock tunnel.

NEW MEXICO.

John Johnson has about finished his contract on the new Moreno shaft at Elizabethtown. The property belongs to G. A. Rothgeb and associates, of Las Vegas. The owners are so well satisfied with the work already done and the results obtained, that they will cantinue operations. This property is situated in a good locality, and many predict for it a fine future.

OREGON.

The dawning of the new year in Granite, Grant county, finds the camp in a very prosperous condition—much more than ever before in its history, says the Baker City *Democrat*. The La Bellevue is working a small crew. Fred Cabell is pushing development on his Onion creek properties. Ike Klopp has a small force on the Ajax and Savage near by. Dr. Russell has 13 men at work on the Canary group, crowding the work night and day. A small force is taking out another shipment of very rich ore from the Cougar. Jerry Seabrook has one man with him on the Campania, at the head of Last Chance gulch. Wm. Robinson is working in the same vicinity. C. S. Miller & Co. are on the Phil. Sheridan group, upper Grauite creek. The Banzette mine, near Robinsonville, under lease to Keeton, Robinson & Co., is drifting on the 75-foot level. The Don Juan and Phœnix mines are both working good crews. The Pyx, under lease to Henry Mounts & Co., has been at last cleared of water and is sending out good ore.

SOUTH DAKOTA.

Black Hills Notes.

A change in the formation is reported to have taken place in the Detroit & Deadwood shaft, Two-Bit.

At the American Express, Blacktail district the work of development is steadily proceeding. Six miners are employed.

The Golden Sands, one of the properties operated by the Horse Shoe Company, is shipping from five to seven cars of ore weekly.

A hoist has been placed in position at the shaft on the Dolcode property, and sinking of the shaft will be done as rapidly as possible.

From among the mining propositions which have paid dividends for the year 1898, the Homestake is credited with $636,250, and the Holy Terror, $81,000.

Owing to the freezing of the water supply, the mill at the St. Elmo has been compelled to shut down, and this has caused suspension of operations in the mine.

Since the discovery that wolframite existed in the vicinity of Lead, mine owners and prospectors have been giving the matter considerable attention, and indications are that a valuable industry will be opened up in this vicinity in the near future.—*Black Hills Mining Review.*

UTAH.

General Notes.

No action was taken by the Bullion-Beck Co. toward the declaration of a dividend in January, and it is likely that it will be passed. Absence of encouraging news, or, in fact, any news at all, is doubtless the cause of the slow action of the stock.

Centennial-Eureka of Eureka, Utah, is shipping some first-class ore. The regular dividend of $15,000 was paid on Jan. 16th. The mine is in splendid condition.

The Eagle Co. of Mercur has reported a rich strike of good ore, but as yet, nothing is known in Salt Lake of the real merits of the strike.

Reports from Eureka say the Eagle and Blue Bell properties are in fine ore and a shipment will soon be made. The stock is selling in Salt Lake City at $2.00 per share.

WASHINGTON.

Messrs. Grainger, Carter, Sullivan and Ramsey now have the Lily R. claim at Republic. They uncovered a six-foot ledge of quartz carrying a good value in gold. The ore from this mine resembles the rock found in the Republic mine.

A force of miners with hand drills are working on two of the ledges encountered in the Palmer mountain tunnel at Loomis and are opening up some fine ledges of ore.

FOREIGN MINING NEWS

LOWER CALIFORNIA.

The La Fortuna Mining Co. of New York have recovered their property located at Agua Dulce, Lower California, from the Mexican government. This property was seized last June by the Mexican officials by reason of the company's manager, Gay Lombard, having clandestinely shipped $75,000 in gold bullion to avoid the payment of three per cent Mexican export duty.

The government placed a heavy fine upon the company, and seized the property for payment. The company was in no way a party to Lombard's actions, and maintained they should recover the property upon the payment of regular duties and the costs to the government in seizing and holding the property.

After a thorough investigation the Mexican

government made liberal concessions, and the money was deposited with the court awaiting orders from the City of Mexico, and H. A. Howard, who had been appointed manager of the mines, was placed in possession of the property.

The company has a 10-stamp mill in operation, and another 10-stamp mill on the ground ready to be erected.

The first work to be done after overhauling the mill will be to pump the water out of the Tesora mine, which is full to the 50-foot level. Until this is done the stamp mill will be operated with custom work, as there is considerable ore on the dumps at other mines in the district. The company has expended about $100,000 at this camp, and has one of the most thoroughly equipped mining camps in Lower California.

BRITISH COLUMBIA.

Herewith are the producers, together with the amounts of ore in pounds each sent forth over the Kaslo & Slocan Railway during the year:

	Pounds.
Payne	13,614,000
Ruth	8,359,000
Whitewater	6,073,000
Last Chance	3,278,000
Slocan Star	2,745,000
Lucky Jim	2,160,000
Montezuma	977,600
Rambler-Cariboo	936,900
Reco	758,000
Antoine	750,050
Queen Bess	310,000
Dardanelles	258,000
Jackson Mines	194,000
Bismarck	146,250
Silver Bell	123,500
Blue Bird	90,000
Eureka	83,500
Sovereign	80,000
Whitewater Deep	78,000
Ajax	74,500
Miller Creek	70,000
Charleston	62,000
Black Diamond	60,000
Native Silver Bell	60,000
Coin	50,000
Goodenough	40,000
Treasure Vault	40,000
Wonderful Bird	33,465
Gibson	32,000
Fidelity	30,000
Stevenson Concentrator	30,000
Great Western	30,000
Texas	24,650
Two Friends	24,000
Ruby Silver	24,000
N. C. Exploration	22,000
Carbonate No. 2	15,800
Fourth of July	7,000
Reno	5,800
C. M. Wilson	5,415
Stranger	2,540
Fountain	1,125
Fletcher Mine	1,000
Total pounds	42,303,115

—*The Kootenaian.*

MEXICO.

Iron is found in such vast quantities in Mexico that practically no effort is made to utilize it, says the Chihuahua *Enterprise*. The Cerro del Mercado. in Durango, is a hill of almost solid mineral, 640 feet in height, 4,800 feet long and 1,100 feet in width; it is estimated that down to the general level, 300,000,000 tons of solid ore could be taken from this hill. The deposits in Mexico are sufficient to supply the universe for centuries to come.

KANSAS LEAD AND ZINC.*

[Continued from our issue of January 15, 1899.]

The most abundant mineral associated with lead and zinc ores is calcite, $CaCO_3$, the carbonate of calcium, often called calc spar, the "tiff" of the miners. This mineral is simply crystallized limestone, and is found in cavities of limestone all over the world, having been produced directly from limestone. In many places it forms beautiful crystals, some of which are from one to two feet in length, and from six to eight inches in diameter. The largest ones thus far observed came from the Gracie Clark diggings, about two miles north of Empire. Elsewhere it has entirely filled the cavities in the rock, be they large or small, and is void of external crystalline form. Always, however, the characteristic cleavage of the mineral is apparent, giving the rhombohedral or diamond-shaped blocks upon breaking. Sometimes it is almost perfectly clear and transparent, the "glass tiff" of the miner; elsewhere some staining matter clouds it and gives it a particular color—light buff, greenish, bluish, or whatever it happens to be.

Calcite is so frequently associated with lead ore and zinc ore that it has generally been looked upon as an indication of the ore wherever found. People throughout the whole country, when digging for lead or zinc ores, like to find quantities of it. In so far as it represents an open condition of the ground it may possibly be that it does signify the probability of a valuable ore being found. Aside from this, however, it is doubtful if there is any relation between the two.

Barite, or heavy spar, the sulphate of barium, $BaSO_4$, sometimes is found associated with both the lead ores and the zinc ores, but never in considerable quantity. Fluor spar, calcium fluoride, $CaFl_2$, also has been found in a few places, but never to any considerable extent.

Aside from these no minerals of any consequence have thus far been observed by the writer as occurring in the lead and zinc mining district of southeast Kansas.

GEOGRAPHY OF LEAD AND ZINC ORES.

The only locality in the state where lead and zinc ores are mined at the present time is in the extreme southeast corner of Cherokee county. Here, from an area scarcely equaling four miles square, the whole of the lead and zinc ores have been mined that have ever been shipped from Kansas. The general character of the country is rugged, narrow valleys skirting each little stream, and hills rising on either side from 100 to 200 feet above the valley.

The western limit of the area is approximately marked by Spring River, although some mining has been done west of this stream. The southern limits of the mines as at present operated may likewise be placed at Shoal Creek, a tributary of Spring River entering from the east. Here also this limit is not an exact one, as some mining has been done beyond. The eastern limit is the state line, valuable mines existing immediately beyond in Missouri. The northern limit as known at present is the Gracie Clark mines, which lie about two miles north of the Memphis railroad station, Galena.

The geographical limits as above given do not really present an exact idea of the area from which the ore has been obtained. The sixteen square miles, probably, is too large by almost one-half, if exact measurements were made. Many confidently expect that the productive area will be widened with future development, and for every reason, as far as geologic conditions are concerned, this may be expected.

Lead and Zinc Ores in other Parts of the State.—No ores of lead or zinc have ever been mined in marketable quantities anywhere in Kansas outside of the Galena disrtrict. About thirty years ago considerable excitement was raised regarding lead ores in the vicinity of Pleasanton. Prospecting was carried on for some time, and many people thought valuable deposits of ore existed there. The results have failed to justify such hopes, as nothing has been obtained, not even enough to send a single consignment to the markets.

To the west, in the vicinity of Walnut and Erie, small amounts of zinc ore have been obtained. Only a few years ago many sensational rumors were afloat regarding the discovery of great ore beds near Erie. The writer visited this locality and conversed with a few people who had been interested in the prospecting enterprises, but at that time was unable to meet the superintendent of the company. He was shown a number of samples of ore which were genuine zinc blende, all of which were reported to have been obtained from that immediate locality. During the latter part of 1897, a student of the University brought samples of limestone near Walnut which contained crystals of zinc blende, some of them being nearly an inch in diameter. Professor Bailey is authority for the statement that small quantities of zinc blende have been found in the rocks near Lawrence. It is common knowledge that small quantities of zinc blende are frequently in the coal mining areas of both Kansas and Missouri.

These facts show conclusively that the zinc ores particularly, and the lead ores to a lesser degree, exist in small quantities in many localities outside of the Galena area. No one has ever succeeded. however, in finding more than mere traces of the ore, and no one would be justified in making a prediction regarding the possibilities of a larger output. The general geologic conditions of these areas discourage the hope of profitable mining in any of them.

(*To be Continued.*)

*From the Annual Bulletin on Mineral Resources of Kansas for 1897, by Erasmus Haworth, Professor of Physical Geology and Mineralogy, University of Kansas, Lawrence, Kansas.

PROCESS OF MINTING COINS.*

BY ALEXANDER E. OUTERBRIDGE.

[Continued from our issue of January 15, 1899.]

The Refining Process.—The metal now passes into the hands of the "melter and refiner,"

We will suppose that the representative deposit that we have already alluded to contains a small percentage of base metals, such as tin and lead, which tend to make the alloy brittle or "short," rendering it unfit for coin. The first operation to which it is subjected is intended to eliminate these impurities, and is called "toughening." The metal is melted in a crucible and an oxidizing flux (saltpeter) is added to it while fluid, the saltpeter or

*Abstract of an address before the Stated Meeting of the Franklin Institute November 9th, 1898, and published in the Journal of the Franklin Institute.

niter decomposes and liberates oxygen gas; the oxygen seizes the base metals forming oxides; these rise to the surface and are dissolved in the flux; the flux, when sufficiently thick, is skimmed off, and the purified metal, consisting only of gold and silver, is poured into cold water to form granulations. The next operation is designed to remove the silver; this is effected by boiling in nitric acid, when the silver dissolves, leaving the gold.

The "plant" used for this purpose consists of a number of large porcelain jars capable of holding about 35 gallons each.*

These are arranged in a double row and heated by steam pipes; they are inclosed in a chamber provided with sliding doors to prevent the escape of the noxious fumes, which are carried into a tall chimney from which they issue in a yellowish cloud. The dissolved silver is drawn off by means of a large siphon made of native California gold (valued at $3,000) and transferred to a vat made of wood (capacity 2,000 gallons), resembling those used in breweries. The vat contains several hundred gallons of salt water, and the silver is precipitated by the chlorine, a workman facilitating the operation by agitating the liquid with a large paddle with long handle.

The precipitated silver is drawn off into large filters on trucks and thoroughly washed by running water until the test of litmus paper shows that all trace of acid has been removed. The chloride of silver now resembles pure white cottage cheese. It is transferred to another vat lined with lead.

*The charge for each jar is usually 190 pounds of granulations and 175 pounds strong nitric acid.

Zinc (which has been previously granulated by pouring while melted into cold water) is added to the silver, together with a little sulphuric acid; the chlorine deserts the siver for the baser metal, forming a soluble salt of zinc. The solution is allowed to flow off, and the precipitated silver, after having been thoroughly washed, is pressed into round cakes called "cheeses," dried in an oven and melted in the furnace; it is finally cast into a bar, and is found to be uncontaminated with its former base associates, being 998 to 999 fine.

After thoroughly washing, to remove the silver nitrate, the gold sediment is placed in cast-iron pots and boiled in strong sulphuric acid with a little niter added; it is then washed, dried, pressed into cakes and melted. The bars are nearly pure gold, about 999 fine.

All that now remains for the melter and refiner to do is to weigh out the requisite amount of copper to form the coin standard, which is nine parts of gold or silver (as the case may be) and 1 part base metal. In other words, our coin standard is nine-tenths fine.

The alloy is melted in large crucibles made of plumbago, holding over 6,000 ounces, and constantly stirred to render the mass homogeneous. The standard metal is cast into flat bars called ingots, 12 inches long, ½ inch thick and from ¾ to 1½ inches wide; the ingots are filed to remove the ragged edges, and the rough tops cut off with large steam shears. Two samples from each melt are assayed, and if the ingots are found to be of the proper fineness and of uniform composition, they are delivered to the coiner.

(To be Continued.)

PERSONAL NEWS ITEMS

W. H. ROUTLEDGE, superintendent Summit Consolidated Gold Mining Co., of Orno Ranch, Eldorado County, Cal., was one of the callers at the JOURNAL office the middle of January. Mr. Routledge reports everything moving along nicely now in Eldorado county, with plenty of water and a resumption of milling all over the county.

JAMES M. PIERSON, well known in Los Angeles County, has just returned to Los Angeles, Cal., from an extended trip in the northern part of the state.

M. J. MARTINEZ, member of the American Society of Mechanical Engineers, has received the appointment of resident agent at Havana, Cuba, for the Snow Steam Pump Works. The business will be conducted under the style of M. J. Martinez, consulting and contracting engineer. Mr. Martinez will be prepared to furnish pumps of the most modern designs, made by the Snow Steam Pump Works, especially adapted for the requirements of the various industries of Cuba and Porto Rico.

F. M. CLARK, JACK DUNN, MAT WHALEN, TONY HOCKEY, OTTO STEVENS, GEO. DEXTER, and GEO. LANE, all of the Iron Chief mine, in the Eagle Mountains of Riverside county, Calif., were in San Bernardino Calif., last week.

OLAF ELLISON, special representative to the Pacific Coast of the United States Commission to the Paris Exposition of 1900, is making a visit to Southern California, and will look over Arizona before returning north.

We desire to know the present address of WM. ORR, assayer and chemist. If any of our readers can give it, they will confer a favor.

P. A. HANSON, general manager of the Squaw Creek mine, South Dakota, arrived in Deadwood, from Minneapolis.

THE MARKETS.

All quotations, financial reports and other statistical figures given under this head are New York Quotations, unless otherwise stated in each item. These figures are carefully revised each issue, and constitute a very accurate compilation of statistical matter.

NEW YORK, Jan. 30th, 1899.

The following are the Silver, Copper and Lead quotations for the last two weeks:

	SILVER.	COPPER.	LEAD
Jan. 13	59¼	13 75	4 10
" 14	59½	13 85	4 10
" 16	59¾	14 00	4 00
" 17	59¾	14 00	4 10
" 18	59¾	14 25	4 20
" 19	59⅝	14 37½	4 25
" 20	59¾	14 50	4 25
" 21	59¾	14 75	4 25
" 23	59⅝	15 00	4 25
" 24	59⅞	15 25	4 25
" 25	59¾	15 50	4 25
" 26	59¾	15 75	4 25
" 27	59¾	16 00	4 35
" 28	59¾	16 00	4 35
" 30	59¾	16 25	4 35

SILVER.

The silver market has been quiet, with business done at slightly declining rates. It is to be noted, however, that the rates for spot and future have been converging so that March silver has commanded a price only a little under metal for prompt shipment.

COPPER.

The unusual demand for copper is causing comment all over the world. The latter part of last month the quotations were $12.50 while today they have reached the remarkable figure of $16.25. Buyers held off as long as possible and have utilized the stock on hand and are now forced to buy to supply their needs, thereby causing the market to be bulled, and as a matter of consequence the price has gone up. We quote for Lake, $16.00 @16.25; electrolytic in cakes, wirebars and ingots, $15.75@$15.87½; cathodes $15.75, With casting copper at 15.87½ @$16.00.

LEAD.

A steady increase in the demand for lead has raised the price to $4.35 with a prospect of it going some higher. There have been considerable quantities of lead withheld from the market with the expectation of securing higher prices, and undoubtedly this will be thrown open, which will cause a reaction and fall in price.

We have to quote $4.27½@$4.35 New York, and $4.20@$4.25 for St. Louis.

SPELTER.

The demand continues fairly steady but is no longer as brisk as it was during the few preceding months. There is quite a disposition on the part of sellers to meet the demand, the quotation being 5.05@ 5.10c at St. Louis and 5.20@5.25c. at New York.

ANTIMONY.

Antimony continues strong, and we quote Cookson's 9¾c.; Hallett's, U. S. Star and Japanese, 9⅛.

NICKEL.

Business still continues on unchanged lines and no alteration in prices can be reported. We quote for New York ton lots 33½c. and 36c per lb and for smaller orders 35½c. and 38c

TIN.

Although the London cables reported a serious break at the beginning of the week, prices here have remained fairly steady on account of supplies being rather meagre. We quote the metal at 18.12½ @18.25c.

PLATINUM.

Prices are now quoted at $15 and $16 per oz., New York. The London quotations are 59 @ 60 s per oz. Supplies are not large and prices are firm. For chemical ware, best hammered metal. In lots of 250 grams or more, 56c, per gram; in lots of 100 grams or more, 57c. per gram; less than 100 grams, 58c. per gram; unmanufactured platinum will be supplied in same quantities at 2c. less per gram.

POTASSIUM CYANIDE.

Purified, 98@99 per cent., in cases of 120 lb. at 32c. per lb, in 5, 10, 25 and 50 lb tins at an advance.

QUICKSILVER.

The New York quotations are unchanged at $39.50. The London price is also unchanged at 7 lb. 5s. per flask, with 7 lb., 4s. named for second ends.

POWDER.

F. o. b., San Francisco: No. 1, 70 per cent. nitro-glycerine per lb, in carload lots, 15¼c: less than one ton, 17¼c. No. 1* 60 per cent., carload lots, 13½c; less than one ton, 15½c. No. 1** 50 percent. carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40 per cent., carload lots, 10c; less than one ton, 12c. No. 2*, 35 per cent., carload lots, 9½c; less than one ton, 11½c. No. 2** 30 percent., carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car, 728 kegs, $1.50 per keg; less car lots, $2 per keg.

COKE.

The trade in coke at St. Louis is reported very quiet—a condition not unusual as the year draws to a close.

IN CAR LOTS, ST. LOUIS.

Connellsville fdy coke 72-hr. f'ry	$4.85
New River	$4.00
Pocahontas	3.90
Crushed	4.85
Gas works coke, lump, per bushel	.10

BORAX.

The San Francisco market in Borax is firm with a good demand.

The market is quoted as follows:

Refined, in carload lots, in barrels	7¼
Refined, in carload lots in sacks	7
Powdered, in car lots	7¼
Concentrated, in car lots	6¾

THE MINOR METALS.

Quotations are given below for New York delivery:

Aluminum:	
No. 1, 98 per cent. ingots, per lb	33@40c
No. 2, 90 " " "	31@34c
Rolled sheets, per lb	38c. up
Aluminum.—Nickel, per lb	33@39c
Bismuth, per lb	$1.30@$1.80
Phosphorus, per lb	40@50c
Tungsten, per lb	70c
Ferro-tungsten, 60 per cent	60c

Variations in price depend chiefly on the size of the order.

CHEMICALS.

Deliveries on contract are good. New contracts have been taken, particularly for alkali. Much 1899 business has been done in domestic caustic soda, and as low as $1.30 f. o. b. works is reported as the contract price.

CAUSTIC SODA.

Quotations for Caustic soda domestic high test are $1.40 @ 1.45 per hundred lbs.

ALKALI.

Domestic, 58 per cent., 50c. @ 55c., foreign 55c. @ 60c. from dock as to style of package.

CARBONATED SODA ASH.

58 per cent., 90c and 95c. per 100 lbs. basis 48 per cent.

BI-CARBONATE OF SODA.

English, $2.12½ @$2.25 per 100 lb. American, bulk $1.25 and $1.50 per 100 lbs. according to brand.

SAL-SODA.

For domestic, 50c. per 100 lb., less usual discounts; English, 65c.@67½c., Concentrated sal-soda, $1.60 @ $1.65 per 100 lbs.

CHLORATE OF POTASH.

Chlorate of potash is quoted at $9.50 and $9.75 per 100 lbs.

CHLORIDE OF LIME.

English prime brands $1.60@$1.70, American, $1.70@$1.80; Continental F., $1.50@$1.60 per 100 lbs.

Acids.

Spot business is only fair, while for next year's delivery a few more contracts have been booked. Oxalic acid has been reduced by the syndicate to 6¼c.; thus the jobbers who have bought heavily at 6½c. are now in a predicament.

Quotations are per 100 lb from New York and vicinity as follows: Acetic acid, commercial, No. 8, $1.40@$1.50; muriatic acid, 18°, $1.10@$1.75; 20°, $1.20@$1.87½; 22°, $1.35@$2.25; according to quantity and brand. Nitric acid 36°, $3.50@$4.75; 38°, $3.75@ $4.62½; 40°, $4@$4.87½; 42°, $4.62½ @$5.25. Oxalic axid, $6.50@$6.75. Mixed acids, according to mixture. Sulphuric acid, 66°, $1.10 for drums and $1.15@$1.75 for carboys. Chamber acid 50°, in jobbing way, $11.50@$12 per ton f. o. b. factory. Blue vitriol $3.50@ $3.62½ for extra grades and $3.37½ for ordinary.

BRIMSTONE.

The market has eased off on the arrival of 2,400 tons, and spot best unmixed seconds can doutless be had at $21 per ton, while futures are obtainable at $19.50@20 per ton. Thirds are nominal at $18.50@90. The shipments of brimstone from Sicily to the United States in November, were 7,300 tons.

NITRATE OF SODA.

Buyers and sellers of nitrate of soda are still to far apart to come to any large sales, though about 5,000 bags were sold recently at $1.52½ per 100 lbs. Sellers are quoting cp to $1.55 for spot, and for futures extending through December, 1899, $1.55 to $1.57½ per 100 lbs.

FINANCIAL NOTES.

Average Prices of Metals

in New York per pound from January 1, 1898:

Month	Copper	Tin	Lead	Spelter
January	10.99	13.87	3.65	3.96
February	11.28	14.08	3.71	4.04
March	11.95	14.38	3.72	4.25
April	12.14	14.60	3.63	4.26
May	12.00	14.52	3.64	4.27
June	11.89	15.22	3.82	4.77
July	11.63	15.60	3.95	4.66
August	11.89	16 23	4.00	4.58
September	12.39	16.03	3.99	4.67
October	12.41	17.42	3.78	4.98
November	12.86	18.20	3.70	5.29
December	—	—	—	—

Average Monthly Prices of Silver.

In New York per ounce Troy, from January 1st, 1898, and for the years 1897 and 1896:

Month	1898 Cents.	1897 Cents.	1896 Cents.
January	56 77	64.79	67.13
February	56.67	64.67	67.67
March	54.90	63.06	68.40
April	56.02	61.85	67 92
May	56.98	60.42	67.78
June	58.61	60.10	68.69
July	59 06	59.61	68.75
August	59.54	54.19	67.34
September	60.68	55.24	65.68
October	60.42	57.57	66 05
November	60.60	57.91	64.93
December	—	58.01	65.24
Year		59.79	67.73

The statement of the United States Treasury, on Thursday, Dec. 8th, shows balances in excess of outstanding certificates as below, comparision being made with the statement for the corresponding date last week:

	Dec. 1.	Changes.
Gold	$244,088,719	I. $2,425,276
Silver	6,842,551	I. 109,110
Legal Tenders	14,972,531	I. 217,561
Treas'y Notes, etc	1,057,619	I. 354,179
Totals	$266,961,420	I. $2,397,768

Treasury deposits with national banks amounted to $96,389,061, an increase of $1,748,060 during this week.

Gold and Silver Exports and Imports.

At all United States ports, October 1898, and year from January 1st, 1898 and 1897:

	OCTOBER. 1897	1898
Gold—		
Exports	$313,311	$1,279,926
Imports	11,775,483	16,227,358
Excess	I. $11,462,172	I. 14,947,432
Silver—		
Exports	$5,225,437	$4,572,827
Imports	3,283,433	2,532,797
Excess	E. $ 1,942,014	E. $1,980,030

	TEN MONTHS. 1897	1898
Gold—		
Exports	$32,989,892	$14,061,849
Imports	28,386,318	143,688,095
Excess	E. $4,612,574	I. $129,596,246
Silver—		
Exports	$ 47 832,111	$34,946,327
Imports	27,164,680	24,924,164
Excess	E. $ 20,667,431	E. $10,022,163

This statement includes the exports and imports at all United States ports, the figures being furnished by the Bureau of Statistics of the Treasury Department.

WANTS

Advertisements of this class containing not more than five lines will be inserted for not exceeding three months in any year, free of charge, to all paid-up annual subscribers.

Other than above $1.00 per month.

Advertisements not accepted for less than one month.

WANTED POSITION of Assayer with Mining Company. Have had expeiience in Milling and Cyanide works besides technical chemical training. References given. Refractory ores treated by Bromo-Cyanide method. Address, Tye JOURNAL Office.

WANTED, by a young man, a position as Assayer, etc; experienced, competent and has a good knowledge of all metallurgical operations. Good references. Address, T. K. JOURNAL OFFICE,

EXPERIENCED Assayer and Cyanide operator desires engagement. The successful and economical treatment of slimy ore or tailings by cyanide a specialty. ADDRESS W. V. WATSON, Ely, White Pine Co., Nev

AN EDUCATED Chemist and Millman, thoroughly understands Milling, Chlorination and Cyanide Processes. Twelve years experience in Montana and Colorado, now open to an engagement. Moderate salary. Address: "Chemist" JOURNAL OFFICE,

MINING MAN of experience will develop Gold property of merit for ⅓ interest, or will bond whole mine and develop. Correspondence with owners only. Give full particulars. Will give satisfactory references. Address P. O. Box 887, Los Angeles, Cal.

FOR SALE!

4-STAMP, 650 lbs, with plates, feeders, etc., on cars free, $400, condition guaranteed; Engine and boiler, new, $350; also 2-stamp Llewelyn Mill; 2-stamp Fulton Engine Works; and 10-stamp Mill with concentration and power cheap; condition guaranteed; also 5-stamp mill complete; PARSONS & HAWKINS, 247 Wilcox Bldg., Los Angeles

A COMPLETE 20-stamp mill and equipment including assay office outfit, see ad page 24. Address. Box 234, LORDSBURG, N. M.

TREMAIN Two Stamp Steam Mill at Tucson, Arizona. 15-H. P. Boiler Pump and every thing complete, set up ready for work. In excellent condition, used less than six months. Address DREDGING MINING MACHINERY CO. Kansas City, Mo

FOR SALE AT A BARGAIN.

A 60-TON copper Smelting Plant, consisting of two 30 ton furnaces, one of which has new, seamless liner. Plant is complete in every detail. Also an 80-ton Silver-Lead Furnace, entirely new, never having been set up. All of the above located immediately adjacent to railroad. Enquire of GARDINER, WORTHEN & GOSS, dealers in Mining and Mill Supplies, Tuscon, A. T.

ANTIMONY BISMUTH

PROSPECTORS having locations of this nature and wishing to sell at once for cash, will do well to address with full particulars, P. O. Box 2078 SAN FRANCISCO, CAL.

A VERY valuable, extensive Lead Mining Property in Southwest Virginia. Shafts sunk over 200 feet and actual work has demonstrated richness of veins and purity of ore. Address: GEORGE FRANKE, Baltimore, Md.

OPPORTUNITY.

GOLD, COPPER AND IRON MINING is profitable and respectable when you have the pay ores to mine. Because of owning more than we can properly manage, we propose to lease one or more valuable mines on equitable terms. Call or write VAN ANDA COPPER & GOLD COMPANY, Inns of Court Building, Vancouver, B. C. Van Anda City, Texeda Island, B. C. 65 Wall Street, New York City.

MINING STOCK QUOTATIONS

BOSTON

Aetna Con	4 00	Franklin	18 75
Allouez	5 13	Gold Coin	—
Arcadian	39 38	Humboldt	3 88
Arnold	12 75	Koyale Con	28 75
Ash Bed	2 25	Lake Sup Iron	—
Atlantic	32 50	Napa	5 50
Balti	28 00	New Idria Mg	—
Bonanza	1 27	Old Dominion	34 38
Boston & C. C	42	Osceola	73 00
Boston & Mont'n	240 00	Parrott	28 00
Breece	—	Pioneer	4 88
Butte & Boston	68 50	Quincy	136 00
Calumet & Hecla	610 00	San Ysabel	6 00
Catalpa	25 00	Tamarack	171 00
Centennial	26 00	Tecumseh	5 75
Crescent	16	Victor	5 50
Dominion Coal	33 00	Washington Ming	1 38
Dominion Pref	116 50	Wolverine	32 60

ROSSLAND, BRITISH COLUMBIA

Alecia	10	Le Roi	7 50
Big Three	15	Lilly May	19¼
Butte	04	Mayflower	08
Caledonia Con	05	Monita	14
Colonna	28	Monte Christo	13½
Commander	12	Morning Star	08
Deer Park	18½	Mugwump	03
Enterprise	18	Nest Egg	03
Eureka Con	05	Northern Belle	04½
Evening Star	05½	Novelty	04
Georgia	02½	Palo Alto	02
Gertrude	12	Phoenix	08
Good Hope	02	Poorman	12½
Grand Prize	03	Red Mount. View	01
Great Western	09½	Rossl'd H'mest'ke	05
Hatue Brown	03	Rossland, Red Mt.	14
High Ore	02¼	Silverine	05
Iron Mask	78	Silver Bell	05
Iron Colt	10	St. Elmo	05¼
I. X. L	10	Virginia	43
Josie	30	War Eagle Con	2 98
Josie Mac	45	West Le Roi	28
Jumbo	47	White Bear	07½

SAN FRANCISCO.

Alta Con	12	Mexican	15
Andes	13	Occidental	52
Belcher	21	Ophir	50
Best & Belcher	16	Overman	07
Bullion	10	Ontario	3 50
Caledonia	52	Plymouth	08
Challenge	13	Potosi	23
Chollar	10	Quicksilver	1 25
Confidence	40	Quicksilver prefd	4 00
Con. Cal. & Va	83	Savage	15
Crown Point	10	Seg. Belcher	3½
Deadwood	45	Sierra Nevada	64
Gould & Curry	13	Silver Hill	10
Hale & Norcross	85	Standard	1 75
Homestake	50 00	Union Con	18
Iron Silver	66	Utah	06
Justice	08	Yellow Jacket	15

COLORADO SPRINGS STOCKS

Acacia	02½	Isabella	23
Alamo	02½	Jack Pot	07¾
American Con	01½	Lillie	—
Anaconda	37	Kimberly	02⅝
Argentum Juniata	20¼	Magnet Rock	01¼
Banner	—	Matoa	29⅝
Bob Lee	01½	Mineral Rock	—
Creede & C. C	04	Mountain Beauty	01⅛
Dante	04	Mollie Gibson	19½
Des Moines	01¼	Moon-Anchor	97
Elkton Con	98⅝	Mount Rosa	12
El Paso	07¼	New Haven	02¼
Emma Aimee	003	Oriole	008
Fanny R	21	Orphan Bell	06
Favorite	02½	Peoples	01
Findley	05¾	Pharmacist	03½
Flower of the West	005	Pilgrim C	02
Golden Crater	003	Portland	1 18
Golden Fleece	22	Pr. Albert	02⅛
Gold & Globe	01¾	Rattler	01¾
Gold King	55	Specimen	03¼
Gould	03	Theresa	08
Granite Hill	01	Trachyte	02
Hayden	004	Union Gold	15¾
Ingham Con	04½	Work	05¾

SALT LAKE CITY

Alice	75	Joe Bowers	27½
Ajax	90	Little Pittsburg	15¼
Alliance	38	Lower Mammoth	73½
Anchor	89	Mammoth	2 00
Buckeye	06	Mercur	7 65
Bullion Beck	5 25	Northern Light	49
Cent. Eureka	38 00	Omaha	53¼
Chloride Point	1 38	Ontario	6 20
Daisy	64	Overland	2 00
Dalton	01¼	Richmond Ana-	
Dalton & Lark	07	conda	05
Daly	85	Sacramento	53¼
Daly West	4 05	Silver King	30 00
Dexter	3 15	Star Consolidated	1 37½
Eagle	06½	Sunbeam	12
Eagle & Blue Bell	1 87½	Sunshine	42
Four Aces	48	Swansea	3 67½
Galena	60	So Swansea	1 28
Geyser-Marion	80	Tetro	13
Golden Eagle	09½	Utah	95
Grand Central	8 00	Valeo	1 40
Homestake	05¼	West M't'n Pl'cer	87½
Horn Silver	1 15	Young America	50

NEW YORK.

Adams Con	08	Japan	5 00
Alamo	05	Jefferson	08
Alice	80	Julia Consolid	01
American Gold	085	Justian	04
Anaconda Gold	60	King & Pemb	13
Belcher	20	Lacrosse	14
Best & Belcher	42	Lagonda	40
Breece	95	Leadville Cons	09
Brunswick	13	Little Chief	17
Caledonia	50	Mexican	40
Cannon Ball	0035	Mollie Gibson	25
Chollar	24	Mt. Rosa	20
Chrysolite	13	Occidental	61
Comstock Tunnel	04	Old Gold	00½
Comstock Stocks	04	Ontario	8 25
Comstock Script	04	Ophir	60
Consolidated Imp	03	Pharmacist	03
Con. Cal. & Va	1 40	Phoenx	13
Copper Rock	00½	Pilgrim	00½
Cr. & Cr. Creek	05	Plymouth	10
Crescent	10	Portland	1 50
Crown Point	15	Potosi	20
Cripple Creek Con	10	Quicksilver	1 75
Deadwood	40	Quicksilver pfd	6 00
Elkton Cons	95	Rocky Mountain	03
Enterprise	35	Savage	18
Father de Smet	14	Sentinel	00½
Garfield Cons	13	Sierra Nevada	1 15
Gold Magnet	00½	Small Hope	1 25
Golden Fleece	25	Standard	1 80
Gould & Curry	22	Union Con	20
Hale & Norcross	1 70	Union	18
Homestake	5 00	Utah Con	12
Horn Silver	1 15	Waldorf	02
Isabella	23	Work	13
Iron Silver	75	Yellow Jacket	22

DENVER STOCK REPORT.

Aetna	001	Keystone	04½
Anchoria Leland	67	Lillie	99
Anaconda	37	Matoa	22¼
Arcadia	01¾	Mollie Gibson	20
Argentum Juniata	20¼	Moon Anchor	97⅞
Banner	—	Mt. Rosa	12
Bob Lee	01	Old Gold	—
Elkton	98⅝	Peoples	01
El Paso G	07¾	Pilgrim C	02
Enterprise	04¾	Pine Creek	003
Fanny R	21	Portland	1 18
Garfield Grouse	—	Prince Albert	01¾
Geo. Washington	002	Republic	02⅝
Golden Eagle	29	Sacramento	02½
Gold Coin	96	Smuggler	24
Gilpin & C C	40	Specimen	03¾
Gilpin Four	004½	Tamarack	007
Golden Fleece	22	Union Gold	13¾
Isabella	23	Virginia M	03⅜
Iron Clad	02⅜	Wheel of Fortune	002½
Jack Pot	03⅝	Work	1/20

MEXICO

Name of Company	State	Price
Alianza	Hidalgo	5
Amistad y Concordia	"	24
Angustias	Guanajuato	390
Arevalo y Anexas	Hidalgo	240
Asturiana y Anexas	Zacatecas	170
Barradon y Cabras	Durango	150
Bartolome de Medina	Hidalgo	100
Cabezon y An	Zacatecas	30
Candelaria de Pinos	"	160
Capuzaya	Durango	120
Carmen	Hidalgo	400
Castellana y San Ram	Tepic	25
Cerro Colorado	Chihuahua	10
Cinco Senores y An	Guanajuato	490
Concepcion y Anexas	S Luis Potosi	160
El Oro	Guanajuato	40
Esparanza y An	Mexico	1,300
Guadalupe	Guanajuato	180
Huautla	Santa Ana	100
Luz de Borda	Michoacan	40
Luz de Maravillas	Hidalgo	100
Pabellon	"	150
Palma	Zacatecas	100
Purisima de los Com	"	5
Real del Monte	Hidalgo	900
Refugio y Va	"	8
Restauradora	Durango	60
San Francisco	Hidalgo	270
S. Ped. Chalchihuites	"	12
San Rafael y Anexas	"	925
do. Free Stock	"	400
San Rafael del Oro	Hidalgo	20
Ste. Maria de la Paz	S. Luis Potosi	650
Sirena	Durango	50
Soledad	Hidalgo	500
Sorpresa	"	250
Trinidad	Guanajuato	40
Tlauzingo	Puebla	27
Union	Hidalgo	260
Zomelahuacan (gold)	Vera Cruz	100
Zona Min de Pozos	Guanajuato	15

NOTE—The above Mexican stocks are figured on the basis of Mexican silver.

INCORPORATED MINES PAYING DIVIDENDS.

	NAMES OF MINES	LOCATION	No. of Shares	Capital Stock	Par Value	Amount of last Dividend	Date of Last Dividend	Total Amount Paid in Dividends	Kind of Mineral Produced
1	Aetna Cons.	California	100,000	$ 500,000	$ 5	$ 10	Oct 1898	$ 150 000	Q.
2	Alaska, Treadwell	Alaska	200,000	5,000,000	25	37½	July 1898	3,550,000	G.
3	Alaska Mexican	Alaska	200,000	1,000,000	5	10	July 1898	299,031	G.
4	Alice	Montana	400,000	10,000,000	25	05	April 1898	1,075,000	G, S, L.
5	Anaconda	Montana	1,200,000	30,000,000	25	1 25	Nov 1898	8 250,000	C.
6	Anchoria Leland	Colorado	600,000	600,000	1	01	Nov 1898	168 000	G.
7	American Gold	Colorado	300 000	3,000,000	10	09	Oct 1898	362,000	G. S. I.
8	Associated	Colorado	1,250,000	1,250,000	1	01	Nov 1898	50,000	G.
9	Atlantic	Michigan	40,000	1,000,000	25	1 00	Feb. 1898	780,000	S.
10	Aurora	Michigan	100,000	2,500,000	25	50	May 1898	750,000	I.
11	Bald Butte	Montana	250,000	250,000	1	03	Oct 1898	627,148	G, C, S.
12	Big Six	Colorado	500,000	500,000	1	00½	May 1898	15,000	G, S.
13	Boston & Montana	Montana	150,000	3,750,000	25	5 00	Nov 189	9.125,000	G, C, S.
14	Breece	Colorado	200,000	5,000,000	25	05	Dec 1898	30,000	I.
15	Bullion Beck and Champion	Utah	100,000	1,000,000	10	10	Dec 1893	2,535,000	G, S.
16	Bunker Hill and Sullivan	Idaho	300,000	3,000,000	10	07	Nov 1898	579,000	S, L.
17	Cariboo	BritishCol	800,000	800,000	1	02	Aug 1898	236,965	G.
18	Calumet & Hecla	Michigan	10,000	2,500,000	25	10 00	Sept 1898	54,850,000	C.
19	Centennial Eureka	Utah	30,000	1,500,000	50	50	Dec 1898	2,250,000	S. L.
20	Central Lead	Missouri	10,000	1,000,000	100	50	Nov 1898	77,000	L.
21	Champion	California	34,000	340,000	10	25	April 1898	296,200	G.
22	Charleston	S. Carolina	10,000	1,000,000	100	1 50	Sept 1898	165,000	
23	Chloride Point	Utah	500,000	500,000	1	01	Dec. 1897	5,000	G, S
24	Colorado Smelting	Montana	100,000	1,000,000	10	50	July 1898	1,595,000	G, S, C.
25	Crowned King	Arizona	600,000	6,000,000	10	02	Oct 1898	208,000	G, S, L.
26	Deadwood Terra	S. Dakota	200,000	5,000,000	25	05	May 1898	1,350,000	G
27	De Lamar	Idaho	400,000	2,000,000	5	29	May 1898	2,451,600	S. L.
28	Dutch	California	150,000	1,500,000	10	04½	Feb 1898	39,000	G.
29	Elkton Consolidated	Colorado	1,250,000	1,250,000	1	01½	Oct 1898	636,961	G, S.
30	El Paso	Colorado	650,000	650,000	1	01	Jan 1898	12,093	G. S.
31	Empire State	Idaho	75,000	750,000	10	10	Nov 1898	35,000	
32	Enterprise	Colorado	500,000	500,000	1	05	Sept 1898	900,000	S, L.
33	Fern	British Col.	200,000	200,000	1	05	Jan 1898	110,000	
34	Geyser-Marion	Utah	300,000	1,500,000	5	02	Sept 1898	96,000	G.
35	Gold Coin of Victor	Colorado	1,000,000	1 000,000	1	01	Oct 1898	120 000	G.
36	Golden Cycle	Colorado	200,000	1 000 000	5	02½	Oct 1898	155,000	
37	Gold Coin	Colorado	200,000	1,000,000	5	05	Nov 1897	160,000	G, S.
38	Golden Reward	S. Dakota		1,000,000		15	Feb 1898	155,000	G.
39	Grand Central	Utah	250,000	250,000	1	12½	Dec 1898	218 750	G, S, C, L.
40	Halls Mines Ltd	British Col	250 000	1,250,000	5	25	May 1898	160,000	
41	Highland	S. Dakota	100,000	10,000,000	100	20	Nov 1898	3,764,718	G.
42	Holy Terror	S Dakota	300,000	300,000	1	03	Sept 1898	117,000	G.
43	Homestake	S Dakota	125,000	12,500,000	100	50	Nov 1898	7,118,750	G.
44	Hope	Montana	100,000	1.000,000	10	10	Mar 1898	762,252	S
45	Horn Silver	Utah	400,000	10 000,000	25	05	Sept 1898	5 210 000	S, L.
46	Idaho	British Col	500,000	500,000	1	05	May 1898	264,000	
47	Iowa	Colorado	1,000,000	1,000,000	1	00½	June 1898	90 000	G.
48	Iron Mountain	Montana	500,000	5 000,000	10	02	Apr 1898	507.500	S.
49	Isabella	Colorado	2.250.000	2,250,000	1	00½	June 1897	270,000	G.
50	Kearsarge	Michigan	40,000	1 000,000	25	10	Aug 1897	160 000	C.
51	Kennedy	Cal fornia	100,000	10.000,000	100	48	Aug 1898	1.796 000	S. L.
52	Le Roi	British Col	500,000	2,500,000	5	10	Apr 1898	775,000	G.
53	Lillie	Colorado	1,000,000	1.000,000	1	01	Oct 1898	146 110	G.
54	Minnesota	Minnesota	165,000	16,500,000	100	1 50	Oct 1898	4.735 000	I
55	Modoc	Colorado	500,000	500,000	1	01	Dec 1898	110,000	G.
56	Montana Ltd	Montana	660,000	3.300,000	5	05⅓	May 1898	2 997.557	G, S.
57	Montana Ore Purchasing	Montana	40,000	1,000,000	25	1 00	Oct 1898	800,000	
58	Morning Star	California	2,400	240,000	100	5 00	June 1898	666,600	G.
59	Mt. Rosa	Colorado	1,000,000	1,000,000	1	02	Jan 1898	60,000	G.
60	Mercur	Utah	200,000	5,000,000	25	12½	Nov 1898	1,218,000	G.
61	Mammoth	Utah	400.000	10,000,000	25	05	Oct 1898	1,330,000	G, S, C, L.
62	Moon Anchor Gold	Colorado	600,000	600 000	1	07½	Nov 1898	281 000	G.
63	Mountain Copper	California	250,000	6,250 000	25	62½	Sept 1898	93,750	C.
64	New York & Hon. Rosario	Central A	150,000	1,500 000	10	10	Oct. 1898	945,000	S, G.
65	Napa	California	100 000	700,000	7	20	Oct 1898	950,000	Q.
66	New Idria Quicksilver	California	100,000	500,000	5	20	Sept 1898	80,000	Q.
67	North Star	California	200,000	2,000,000	10	25	Nov 1898	500,000	G.
68	Ontario	Utah	150,000	15,000,000	100	75	Dec. 1897	13,542,500	S, L.
69	Osceola	Michigan	50,000	1,250,000	25	2 00	Dec 1898	2,552.500	C.
70	Parrot	Montana	230,000	2,300,000	10	30	Oct 1898	2,069 898	C.
71	Pennsylvania Consolidated	California	51,500	5,150,000	10	05	Oct. 1898	46,500	
72	Pioneer	California	100,000	1,000,000	10	12½	Dec 1898	50 000	G.
73	Portland	Colorado	3,000,000	3,000,000	1	02	Nov 1898	2,250,080	G, S.
74	Princess	Colorado	1,000,000	1,000,000	1	00½	Feb 1897	47,000	G.
75	Quincy	Idaho	100,000	2,500,000	25	3 50	Aug 1898	10,120,000	C.
76	Rambler-Cariboo	British Col	1,000,000	1,000,000	1	02	April 1897	40,000	
77	Raven	Colorado	1,500,000	1,500,000	1	01	March 1898	20,000	G.
78	Reco	British Col	1,000,000	1,000,000	1	10	Jan 1898	287,500	S, L.
79	Republic	Washington	1 000,000	1,000,000	1	03	Dec 1898	90,000	G.
80	Sacramento	Utah	1,000,000	5,000,000	5	00½	Nov 1898	67,000	G.
81	Santa Rosalia	California	100,000	100 000	1	10	Feb. 1898	125,000	G, S.
82	Small Hopes Consolidated	Colorado	250,000	5,000,000	20	10	June 1898	3,300,000	S.
83	South Swansea	Utah	150,000	150,000	1	05	Oct 1898	125 000	S, L.
84	Standard	California	200 000	20,000,000	100	10	Aug 1898	5,674,940	G, S.
85	St. Joseph	Missouri	30,000	3,000 000	10	1 50	Sept 1898	2,747,000	L.
86	Silver King	Utah	150 000	3,000,000	.20	25	Dec 1898	1,800,000	S, L, G.
87	Slocan Star	British Col.	2,000,000	1,000,000	0.50	05	Mar 1897	350,000	
88	Smuggler	Colorado	1,000,000	1,000 000	1	01	Oct 1898	1,075,000	S, L Z.
89	Swansea	Utah	100 000	500,000	5	05	Dec 1898	136,500	S L.
90	Tamarack	Michigan	60,000	1,500,000	15	3 00	June 1898	5,331,000	C.
91	Victor	Colorado	200,000	1,000,000	5	50	Dec 1898	1,155,000	G.
92	Vindicator	Colorado	1,500,000	,500 000	1	05	Oct 1898	180,500	G.
93	Western Mine Enterprise	Montana	500,000	1 500,000	1	20	Jan 1898	48,680	
94	War Eagle	British Col.	2,000,000	,000,000	1	01½	Oct 1898	239,000	
95	Wolverine	Michigan	60 000	2,500,000	25	1 00	Oct 1898	60,000	C.
96	White Water	British Col.	125,000	1,625,000	5	32	April 1898	194,000	
97	Yellow Aster	California	100,000	1,000,000	10	10	Oct 1898	148,789	G.

S, Silver. G, Gold. L, Lead. C, Copper. Q, Quicksilver. I, Iron. Z, Zinc.

N. B.—Companies not listed have not paid a dividend for the last twelve months.